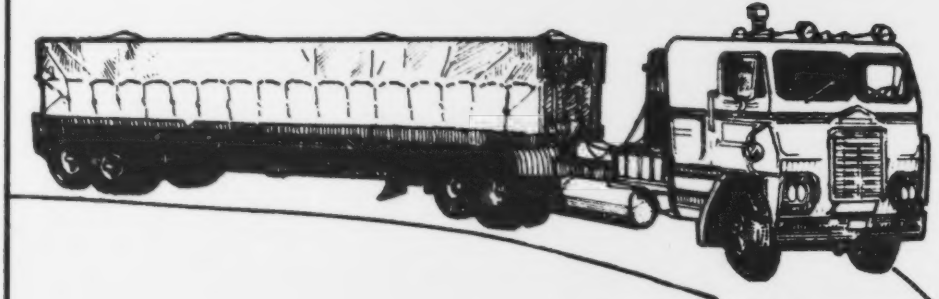
Trucking in the Changing Grain Industry

(phase 1)



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TRUCKING IN THE CHANGING GRAIN INDUSTRY (PHASE I)

by
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Production and Resource Economics Branch
Alberta Agriculture
June 1985

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SECTION I

INTRODUCTION

The federal government promoted railway expansion by granting monopoly rights to the railways with respect to movement of grains for export from certain areas of the Prairies. The railways constructed as many lines as possible to help establish centres of trade. Country elevators were constructed on this scattered network of rail lines to receive grain for domestic and export shipments.

The railway has been the most common mode of grain transportation for domestic use and export throughout the Prairies until the early seventies. The rising costs of branch line operations over the last several years forced the railways to consider abandonment of many uneconomical light density rail lines, resulting in consolidation of country elevators. On August I, 1974, the total number of licensed primary elevators in Alberta was 1,357 with a capacity of 3.409 million tonnes (121.7 million bushels). Ten years later, this number had decreased to 913. Similarly the number of elevator points during the same period decreased from 449 to 343.

Over the last 20 years, the road network in Alberta has increased to 151,470 kilometres (94,139 miles) while the railway network used for hauling grain has decreased by five per cent to 8,689 kilometres (5,400 miles). As the number of commercial carriers has increased with highway and road improvement, the dominant position of railways in providing transportation service on short hauls has diminished considerably. During the early seventies, the trucking industry in Alberta showed tremendous growth. The number of grain trailers increased to over 400 in September 1974 from approximately 100 about 3-4 years earlier. Motor truck transportation, which was first developed as a "feeder" to bring grain from production areas to the rail sites, has played an important role as an alternative mode of grain transportation for the branch line abandoned areas. Since the early seventies, there has been a significant increase in trucking grain to distant country elevators, inland terminals and feed mills, etc. When there has been a shortage of rail cars, trucks have been used to haul rapeseed to the west coast for export purposes.

Rail line abandonments and closure / consolidation of country elevators have increased the demand for truck services. Because of the development of more powerful and efficient motor vehicles, the trucking firms have increased the capacity and payloads of the units used. With the increase in highway and road networks, the role of trucking has become more prominent. However, the use of commercial trucks for transporting grain raises a number of questions: What would be the cost of moving grain by trucks as compared to projected costs of rail transport? How efficient would a commercial trucking operation be as a replacement? Would farmers use the opportunity to do custom or commercial trucking as a sideline to their present farming activities?

The passage of the Western Grain Transportation Act (WGTA) to reform the statutory (Crow's Nest) rates on grain could make custom/commercial trucking more attractive in

hauling grain from the farm to main line rail shipping points. Under the act, the crow benefit is to be paid to the railways. This does not give farmers the opportunity to evaluate alternatives for transporting grain. However, in this study, attempt has been made to assess the impact of reforms in the statutory rates on the trucking of grain.

In the late eighties, when the statutory rates increase four or five fold plus the country elevation and storage charges, trucking grain over longer distances to more central locations could become a reality. Therefore, the emphasis of this project was to study in depth the role of trucking grain for short and long hauls.

When preparing the terms of reference, it was decided that this study would be undertaken in two phases. The objectives were outlined for both phases and it was anticipated that work on Phase II would start after the completion of Phase I.

Objectives for Phase I

1. To describe the present trucking activity for the transportation of grain and grain products in Alberta;
2. To determine the future role of trucking in Alberta in view of closure/consolidation of country elevator facilities;
3. To describe the present commercial trucking activity for the transportation of grain and grain products from Alberta to British Columbia for domestic use; and
4. To measure the effects of the reforms in the statutory rates on the trucking of grain to Alberta Terminals Limited (ATL) and other major inland terminals.

Objectives For Phase II

1. To determine the future role of trucking for grain transportion under the scenarios:
   a) pay the railway,
   b) pay the producers.
2. To determine the future role and prospects for commercial trucking to transport grain to the export positions under the new statutory rates.

In Phase II, emphasis would be on opportunities for the farmers on how to ship grain if method of payment were changed in their favour or what impact the method of payment would have on their choice of transporting grain from the farm to country elevators or other primary grain collection facilities. In regards to objective number 2, it was realized that trucking may not be feasible now to replace rail for long hauls, but may serve as a "feeder" to expedite rail traffic and efficient use of railway equipment.

Work on Phase II of this study would be undertaken sometime during fall 1985.

Source of Data

No formal survey was undertaken to obtain the required information for this study. As a joint study between the Departments of Agriculture, Economic Development, and Transportation, extensive consultations were undertaken to develop as much information as possible in-house from the primary and secondary sources. Some of the information on grain distribution and country

elevator throughput were obtained from the Livestock Feed Board of Canada, Canadian Grain Commission Annual Reports and Canada Grains Council Study on Prospects for the Prairie Grain Industry to 1990.

Data on farm and commercial truck characteristics were obtained from the Solicitor General's Department - Motor Vehicle Branch, and Alberta Motor Transport Board in Red Deer. Commercial truck tariffs were obtained from the tariffs published by the Western Tariff Association in Calgary and farm truck costs were taken from an earlier departmental study and were up-dated to the 1983-84 crop year using western Canada farm input indicies.

Preliminary discussions were also held with a private consultant and senior officials of the federal and provincial governments to obtain some feedback on the terms of reference. Initial contacts were also made with selected grain carriers to assess the impact of reforms to the statutory rates on commercial grain trucking from their perspective.

SECTION II

ELEVATOR SYSTEM AND RAIL/ROAD NETWORK IN ALBERTA

The primary elevator system is the key component of the present grain handling and storage system in western Canada. It serves as a vital link in the marketing of grain both at home and abroad. The primary function of this system is to collect small quantities of grain from producers and to assemble these into larger units of the proper types and grades of grain to be transported to inland terminals or export positions. Some of the functions of a primary elevator are receiving, grading, weighing, binning and shipping operations.

The primary elevator system[1] on the Prairies developed at a time when producers delivered their grain by horse and wagon. As the railways expanded their branch line network, the grain companies built primary elevators along these branch lines to attract grain business. While the producers have long since abandoned the horse and wagon as a means of moving grain from the farm to primary elevator, the spatial relationship among primary elevators has remained the same. Although the grain companies started closing the non-profitable country elevators during the forties and fifties, there was still a large number of primary elevators serving the grain producers. Rationalization of primary elevators accelerated during the sixties and seventies. The older facilities required extensive repairs, and their overall throughput was declining, which resulted in increased operating costs. Branch line abandonments also resulted in the closure of some primary elevators as the railways could not provide service for branch lines which were uneconomical to operate.

Historical Record of Elevators in Alberta

Historically, the primary elevator system has been comprised of many small units handling relatively small volumes of grain. With the

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[1] In 1971, Canada Grains Act, country elevator was changed to primary elevator.

development of the commercial grain industry, competition among the grain companies and lack of proper grain delivering facilities over longer distances facilitated the development of the network of primary elevators.

The first elevator in western Canada was built in 1879 and for the next 50 years, primary elevator construction continued to accelerate. There was one elevator in 1879; 90 in 1890; 454 in 1900; 1049 in 1905 and 5,746 in 1934. This climaxed the maximum number of such elevators in western Canada. From 1934 the number of elevators declined year by year and by 1973, it had decreased to 4,383 made up of 540 in Manitoba, 2,431 in Saskatchewan, 1,390 in Alberta and 22 in British Columbia.

Total storage capacity, however, increased constantly until 1971, from 857,000 tonnes (32 million bushels) in 1905 to 10.8 million tonnes (396 million bushels) in 1971. The following year it began to decline for the first time and on August 1, 1973, it had declined to 368 million bushels (10 million tonnes).

Increased storage capacity was the result of the construction of elevator annexes and replacement of older elevators with larger elevators. The sharp decline in 1972 came from the closure of numerous elevators made redundant by the sale of Federal Grain Limited's grain assets to the three prairie wheat pools.[2]

Construction of primary elevators in Alberta peaked in 1933-34, when the number of licensed elevators reached 1,781 with a capacity of 1.8 million tonnes (67 million bushels) at 580 delivery points. In 1945-46, although the number of country elevators have decreased to 1,735, the overhaul capacity increased to 2.7 million tonnes (99 million bushels) and the number of delivery points increased to the highest level at 620. Ten years later, i.e. in 1955-56, the number of primary elevators have decreased to 1,730 and the delivery points to 591. Capacity to store grain at these elevators increased to 3.2 million tonnes (118 million bushels). In the years ahead, the number of delivery points and primary elevators continued to decline, reaching 535 and 1,573, respectively in 1970-71. The closure of primary elevators has continued through the seventies and into the eighties. The number of primary elevators, delivery points, capacity and throughput of these elevators from 1965-66 to 1983-84 are listed in Table 1. During the last 18 years, primary elevators have been closed on an average of 2.5 per cent per crop year and the number of stations or delivery points has decreased by an average of about 2 per cent per year. From 1965-66 to 1983-84 the overall capacity of the primary elevators decreased by 23 per cent.

Capacity and Throughput of Elevators

As discussed above, the capacity of primary elevators in Alberta has been declining since 1970-71 when it was at its highest level at 3.7 million tonnes. Although the number of elevators,

2 Canadian International Grains Institute, "Grains and Oilseeds, Handling, Marketing and Processing", Winnipeg, Manitoba, May 1975, p. 67.

TABLE 1

HISTORICAL RECORD OF LICENSED PRIMARY ELEVATORS IN ALBERTA, 1965-66 TO 1983-84

Crop Year	No. of Elevators	No. of Delivery Points	Capacity (tonnes)	Throughput (tonnes)
1965-66	1,612	551	3,562,060	4,599,670
1966-67	1,602	546	3,587,640	5,708,451
1967-68	1,589	543	3,606,810	4,110,247
1968-69	1,582	540	3,638,910	4,059,250
1969-70	1,574	538	3,688,210	4,261,861
1970-71	1,573	535	3,726,370	5,888,846
1971-72	1,543	522	3,694,300	5,419,622
1972-73	1,435	468	3,526,640	6,246,593
1973-74	1,390	456	3,464,480	6,097,711
1974-75	1,357	449	3,409,410	5,762,404
1975-76	1,330	441	3,371,270	7,271,838
1976-77	1,290	426	3,293,830	7,946,676
1977-78	1,232	406	3,184,850	6,595,400
1978-79	1,210	401	3,167,270	6,309,100
1979-80	1,174	394	3,105,730	8,156,400
1980-81	1,097	374	2,981,270	9,293,100
1981-82	1,040	365	2,901,340	9,887,800
1982-83	979	356	2,778,610	10,079,100
1983-84	899	343	2,740,080	10,114,600

Source: Canadian Grain Commission, "Grain Elevators in Canada", Crop Years 1966-67 to 1983-84.

delivery points and capacity continued to decrease, the throughput continued to increase because of increased production and efficient handling of grain. Table I shows the capacity and throughput of the primary elevators in the province from 1965-66 to 1983-84. On an average, the throughput ratio has been between 2.5 to 3.5 per crop year. Figure 1

shows the estimated throughput and location of elevators in Alberta.

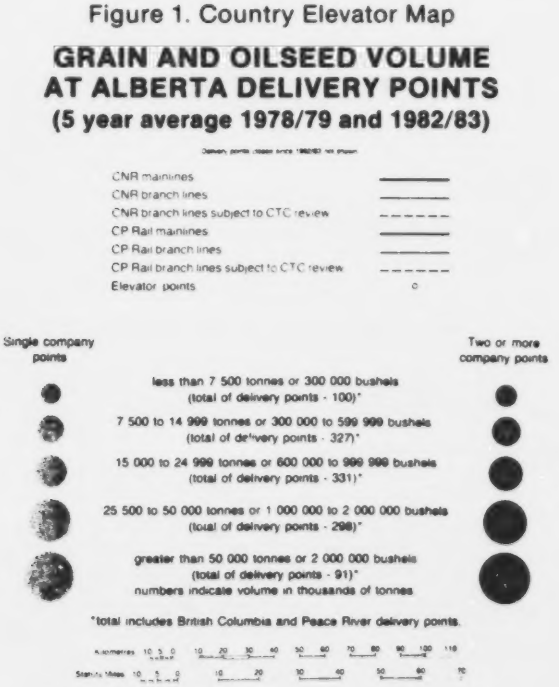
Data in Table I show that the largest reduction in elevator points occurred between the 1971-72 and 1972-73, and the 1982-83 and 1983-84 crop years. With the closure of most of the branch lines, it could be anticipated that consolidation of country elevators would continue, but not at the same pace as in the past. The elevators which require major renovations and fail to receive the throughput required for economical operation would be closed, possibly to be replaced by high throughput elevators. Throughput is very important for an elevator to be efficient and economical. The concept of high throughput elevators has been discussed in Section VII under grain handling efficiency measures.

Rail Network in Alberta

Alberta is well-served by the railroad system. It was the major mode of transportation until the early sixties. Before the branch line abandonments, railroads provided a good link between small communities, towns and cities. Owing to increasing operating costs and the deterioration in maintenance of the system, railroad service has been diminishing in favour of trucks, especially on short hauls.

Rail is still the most economical mode for long distance hauls and large volumes. Because of the longer distances to export position, grain traffic is dependent on railways as are the other commodities for shipments overseas and to other provinces. Figure 2 shows the rail network in

Figure 1. Country Elevator Map


GRAIN AND OILSEED VOLUME
AT ALBERTA DELIVERY POINTS
(5 year average 1978/79 and 1982/83)
CNR mainlines
CNR branch lines
CNR branch lines subject to CTC review
CP Rail mainlines
CP Rail branch lines
CP Rail branch lines subject to CTC review
Elevator points
Single company points
Two or more company points
less than 7 500 tonnes or 300 000 bushels (total of delivery points - 100)*
7 500 to 14 999 tonnes or 300 000 to 599 999 bushels (total of delivery points - 327)*
15 000 to 24 999 tonnes or 600 000 to 999 999 bushels (total of delivery points - 331)*
25 500 to 50 000 tonnes or 1 000 000 to 2 000 000 bushels (total of delivery points - 298)*
greater than 50 000 tonnes or 2 000 000 bushels (total of delivery points - 91)*
numbers indicate volume in thousands of tonnes
*total includes British Columbia and Peace River delivery points.

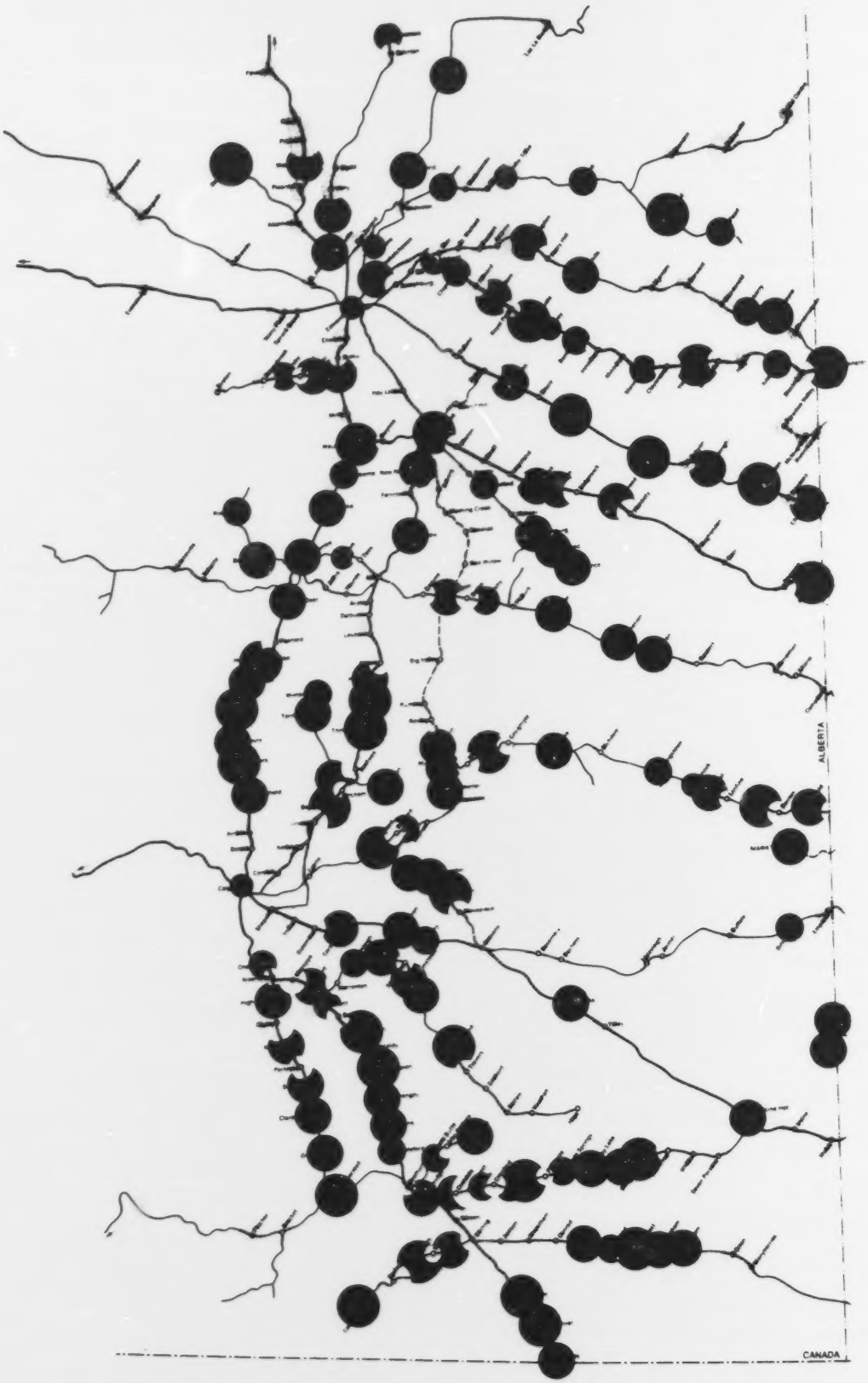


Figure 1. Country Elevator Map

Alberta and the status of various branch lines as of January 1984.

The rail network in Alberta was 9,142.2 kilometres (5681.9 miles) in 1964 which increased to about 10,020 kilometres (6227.2 miles) in 1974. At present, the rail network in the province is about 10,178 kilometres (6,326 miles) which includes industrial arteries and urban links. Grain dependent rail lines including the branch lines extend about 8,689 kilometres (5,400 miles) in Alberta. Details on the status of railway branch line abandonments are presented in Section VII under branch line consolidation.

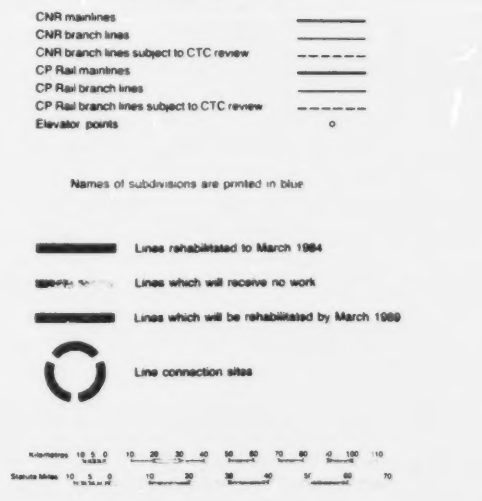
Road Network in Alberta

Massive road network development has played an important role in the development of agriculture in Alberta. Construction of primary and secondary highways, gravel and oil surfaced roads have brought major changes in the transportation system. Communities and areas which were captive to the railroads about 20 years ago, have direct access to market outlets and supply centres because of the highway network system.

The demand for a better road network increased when the railways decided to abandon some uneconomical grain-dependent branch lines and grain companies decided to rationalize the country elevator system. The need for new road links and for improved highways will continue as new areas are developed to expand agricultural production. Expenditures on highways and other parts of the road network are discussed in Section VI under road construction expenditures and maintenance.

Alberta has a good road network and it continues to expand. At present, there are 15,237 kilometres (9,470 miles) of primary highway network (paved); 10,436 kilometres (6,487 miles) of oil treated road network; 102,681 kilometres (63,817miles) of gravelled roads; and about 23,116 kilometres (14,367 miles) of graded roads for a total of 151,470 kilometres (94,139 miles). Figure 3 shows the primary and secondary road network in Alberta.

Figure 2. Rail Network in Alberta


STATUS OF ALBERTA RAIL NETWORK
(January 1984)
CNR mainlines
CNR branch lines
CNR branch lines subject to CTC review
CP Rail mainlines
CP Rail branch lines
CP Rail branch lines subject to CTC review
Elevator points
Names of subdivisions are printed in blue
Lines rehabilitated to March 1984
Lines which will receive no work
Lines which will be rehabilitated by March 1989
Line connection sites

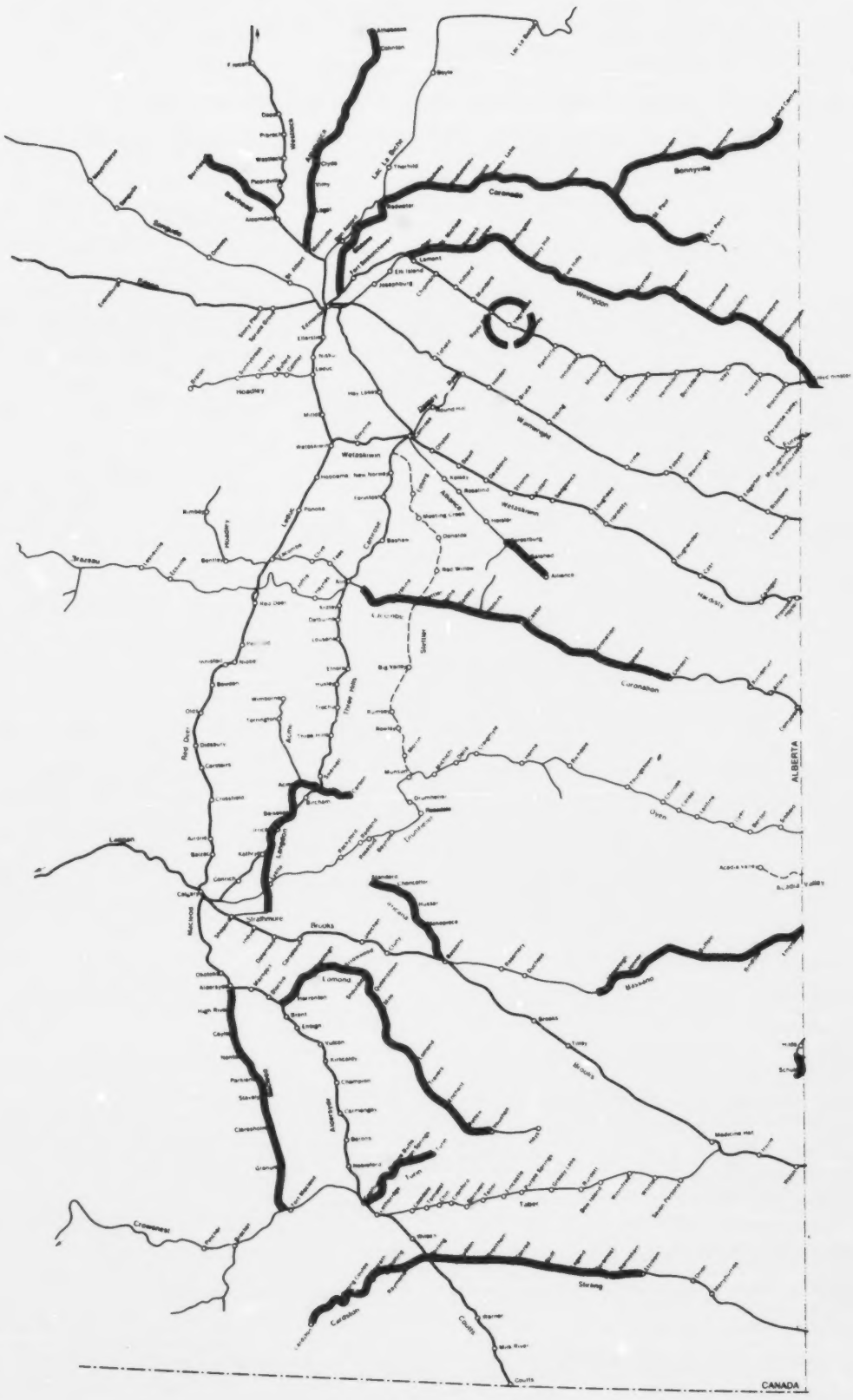


Figure 2. Rail Network in Alberta

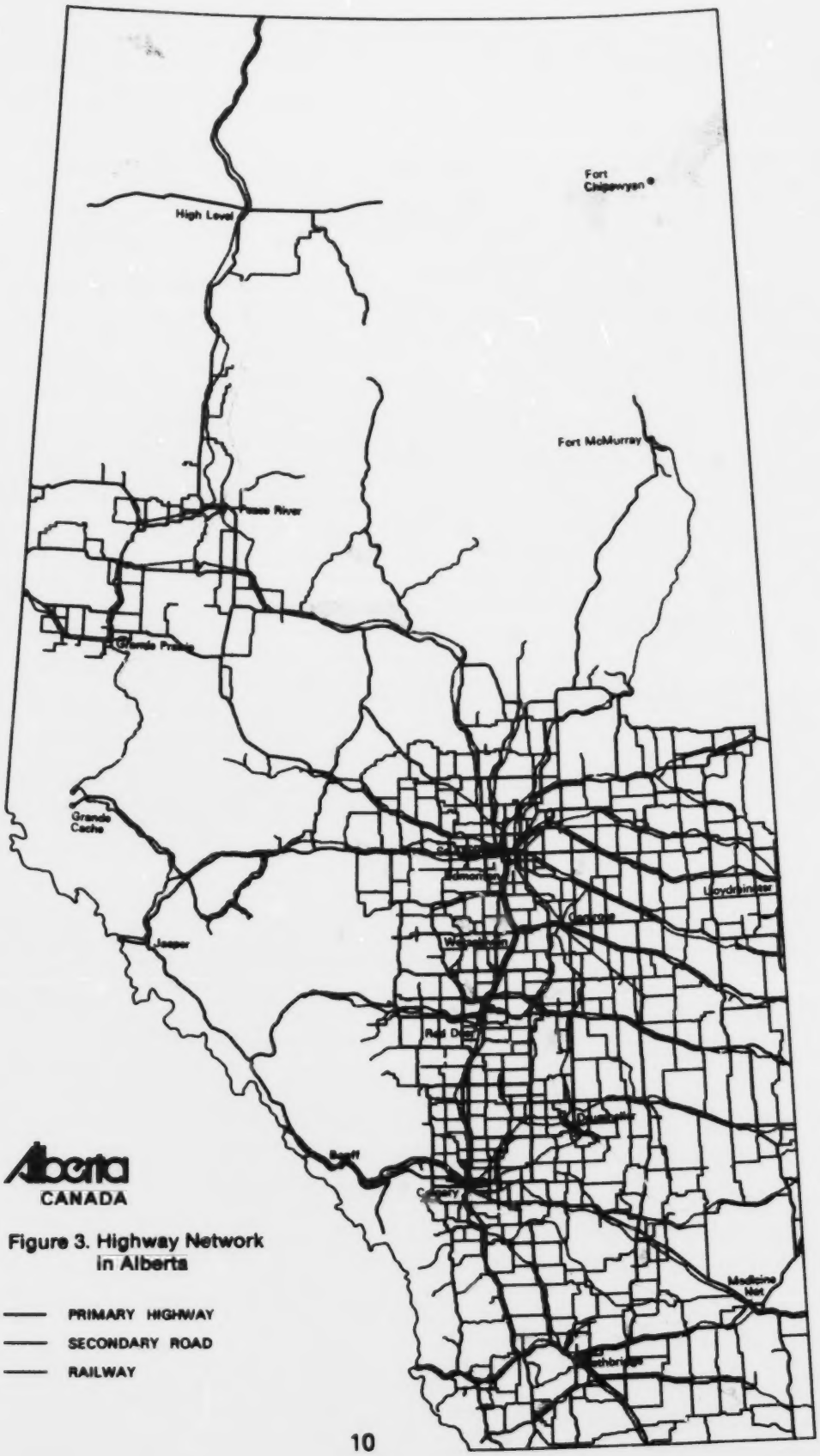


Figure 3. Highway Network in Alberta

SECTION III

GENERAL CHARACTERISTICS OF FARM TRUCKS

Number of Farm Trucks in Alberta

There has been a considerable change in the size of the farm truck fleet in Alberta. In 1972-73, the total number of farm trucks registered in Alberta was 109,676 of which over 80 per cent were under the 6,000 kg. (13,225 lb.) gross vehicle weight class, and about one per cent were in over 14,000 kg (30,860 lb.) group. Farm truck registrations increased by eight per cent to 117,931 in 1973-74 and continued to increase by an average of about four per cent per year up to 1982-83. In 1983-84, the number of trucks on Alberta farms registered with the Motor Vehicle Branch decreased for the first time by over three per cent from the previous year.[1]

As shown in Table 2, there was a considerable increase in farm truck registrations from 1975-76 to 1976-77, by about 19.5 per cent in one year. Most of this increase could be attributed to new purchases of farm trucks in 1976-77. Table 2 presents the registration of farm trucks with the Motor Vehicle Branch from 1972-73 to 1983-84. Data from 1977-78 to 1979-80 were not available for publication.considerably from the numbers reported in some earlier studies.

Distribution Of Farm Trucks By Gross Vehicle Weight (GVW)

The number of farm trucks in Alberta has continued to increase with the increased production of farm products, and heavier trucks were substituted when the earlier models became obsolete. It was not possible to determine the distribution of farm trucks by gross vehicle weight for the years before 1980-81, as most of the information was compiled manual ly. However, for a few selected registration years, i.e. 1972-73 and 1976-77, farm trucks were registered by the gross vehicle weight classification.

In 1976-77, the number of farm trucks under 6,000 kg (13,225 lb.) dropped below 77 per cent as the number of heavier trucks increased. Table 3 shows the distribution of farm trucks by gross vehicle weight from 1980-81 to 1983-84 (registration years).

During the 1980-81 registration year, the number of farm trucks under 6,000 kg (13,225 lb.) gross vehicle weight (GVW) class dropped to 69.4 per cent from about 77 per cent in 1976-77. The number of heavier farm trucks i.e. over 14,000 kg (30,860 lb.) GVW increased to 4.5 per cent of all farm trucks registered in 1980-81. In 1976-77, the number of these trucks was just about one per cent of all farm trucks registered in that year.

In 1981-82, the number of small trucks (under 6,000 kg) slightly decreased to 69 per cent of all farm trucks registered in Alberta. During the 1982-83 and 1983-84 registration years, their number decreased to 67.9 per cent and 66.4 per cent,

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1 Prior to 1983-84, vehicles other than farm trucks were registered as farm vehicles, the same category as trucks, e.g. cars, stations wagons, utility vehicles and motor homes, etc. The motor Vehicle Branch has tightened the registration procedures since 1983-84, and only those vehicles which are used for farming operations are issued farm plates, i.e. trucks. The number of farm trucks reported here has

been obtained by registration year (April 1 to March 31) of vehicles and could vary respectively. Purchases of larger trucks (over 14,000 kg) have continued to increase during the last 4-5 years and now stand at 5.4 per cent of all farm trucks in Alberta registered during 1983-84. In the future, such information may be difficult to obtain because of the staggered registration procedure implemented in the fall of 1983. However, data presented in Table 3 clearly indicate a trend towards heavier farm trucks as the demand for increased transportation services on and off-farm continues to grow. The increase in truck operating costs and the increase in volume of farm production can be met more economically with larger trucks.

Age of Farm Trucks

Farm trucks in use in Alberta show a wide range of ages. The age of a truck is an important component of the cost function since newer trucks are more fuel efficient and tend to develop more power out of smaller size power units. Heavy farm trucks usually last longer because they are used relatively less than smaller trucks. At the time of registration, owners are required to record the year of the vehicle. Data on age of farm trucks were obtained from the Motor Vehicle Branch. Table 4

TABLE 2

NUMBER OF FARM TRUCKS REGISTERED IN ALBERTA

Registration Year	No. Of Farm Trucks	% Change From Previous Year
1972-73	109,676	-
1973-74	117,931	7.6
1974-75	129,074	9.5
1975-76	132,067	2.4
1976-77	157,810	19.5
1977-80	(1)	(1)
1980-81	161,900	2.6
1981-82	163,152	0.8
1982-83	167,508	2.7
1983-84	161,875	(3.4)

(1) Data not available

Source: Solicitor General's Department, Motor Vehicle Branch, Vehicle Registration Statistics.

shows the year of farm trucks registered in Alberta from 1980-81 to 1983-84.

In the 1960 and earlier category, some trucks reported 1949 as the model year. According to the 1983-84 registration, over 21 per cent of the farm trucks in Alberta were 10 to 13 years old, about 39 per cent were 4 to 8 years old and over 18 per cent were about 3 years old and newer.

The data show that purchase of heavier trucks has increased over the years as older trucks have become obsolete. The purchase of heavier trucks is primarily geared to achieve transportation efficiencies. The purchase of smaller trucks used on and off farm has somewhat declined during the last several years. Farmers have to consider several factors like fuel efficiency, operating and maintenance costs, payload of the truck, etc. when replacing older trucks. The distribution of farm trucks by gross vehicle weight and age of trucks for the registration years 1981-82, 1982-83 and 1983-84 is presented in the Appendix Tables A, B and C.

Distribution of Farm Trucks by Fuel Type

During the sixties and seventies no attempt was made to classify farm trucks by fuel type. Provision of such information were voluntary and quite often the owners of farm trucks did not indicate the type of fuel used by their trucks. In 1976-77, an attempt was made to classify farm trucks by fuel type. An

TABLE 3

DISTRIBUTION OF FARM TRUCKS BY GROSS VEHICLE WEIGHT

GVW (kg)	1980-81	1981-82	1982-83	1983-84
0- 2,000	4,533	4,321	18	10
2,001- 3,000	35,294	34,739	37,761	36,501
3,001- 4,000	30,761	30,855	31,030	28,848
4,001- 5,000	27,907	28,160	29,002	27,385
5,001- 6,000	13,762	14,383	15,816	14,738
6,001- 7,000	5,851	6,014	6,041	7,476
7,001- 8,000	6,314	6,348	6,765	7,086
8,001- 9,000	1,781	1,791	1,859	1,788
9,001-10,000	1,943	1,997	1,750	1,611
10,001-12,000	7,497	7,556	7,357	6,913
12,001-14,000	18,972	19,743	21,055	20,813
more than 14,000	7,285	7,245	9,054	8,706
TOTAL	161,900	163,152	167,508	161,875

estimated 1,188 diesel trucks (0.8 per cent) out of 157,810 were registered during that year. The number of diesel trucks reported in 1976-77 was considered low as more than half of the owners did not indicate the type of fuel used in their trucks. In 1981-82, about 41 per cent of the farm truck owners reported fuel type of their vehicles. There were 2,264 diesel trucks or 1.4 per cent of all farm trucks in Alberta. About half of the diesel trucks reported in 1981-82 were in the over 14,000 kg (30,860 lb.) class.

During the 1982-83 registration year, the type of fuel used in vehicles was recorded and owners were required to provide this information. The number of farm diesel trucks reported more than doubled to 6,036 out of 167,508 farm trucks registered in Alberta (3.6 per cent of all farm trucks). Since the early eighties, farmers have been buying an increasing number of heavier diesel trucks in order to replace older gasoline trucks, because of better fuel efficiency, more power and the longer life of these units. During the 1983-84 registration year, the number of diesel trucks increased to 4.3 per cent (6,891) of the 161,875 farm trucks registered in Alberta. Table 5 shows the distribution of farm trucks by fuel type.

The distribution of farm trucks by fuel type, gross vehicle weight, and by age for the years 1981-82, 1982-83 and 1983-84 is presented in the Appendix Tables D, E and F.

Use of Farm Trucks

Farm trucks are used for hauling farm products and supplies to and from the markets. Smaller trucks are used more frequently for picking up small loads of supplies and for other on- and off-farm uses. Farm trucks are used most commonly for hauling grain either from the fields to graneries / storage or from farm storage to the primary

TABLE 4

MODEL YEAR OF FARM TRUCKS

Model Year	Registration Years 1980-81	1981-82	1982-83	1983-84
	---------- Number of Farm Trucks ----------			
1960 and earlier	8,743	8,002	7,318	6,207
1961 to 1965	10,523	10,239	9,475	8,495
1966 to 1970	22,666	21,995	20,837	18,883
1971 to 1975	39,504	39,112	37,575	34,492
1976 to 1980	64,436	67,162	67,117	63,627
1981 and over	16,028	16,642	25,186	30,171
TOTAL	161,900	163,152	167,508	161,875

TABLE 5

DISTRIBUTION OF FARM TRUCKS BY FUEL TYPE

Fuel Type	1981-82	1982-83 --- No. of Farm Trucks Registered ---	1983-84
Gasoline	65,036	161,295	154,587
Diesel	2,264	6,036	6,891
Propane	21	137	277
Natural Gas	1	3	1
Multifuel	429	16	40
Others (undetermined)	10	21	26
Not Reported	95,391		53
TOTAL	163,152	167,508	161,875

elevators and other market outlets, e.g., feed mills, grain processing facility, feed lots, etc.

A survey of over 200 farmers in 1982 showed some clear, weight- related patterns of use for farm trucks. As vehicle weight increases, there is a corresponding increase in the use of trucks for hauling crops. The hauling of farm supplies showed the reverse pattern; lighter trucks are used proportionately more. As mentioned above, farm supplies are purchased in small quantities which can be handled by smaller trucks, or are purchased in bulk and then often hauled by larger commercial trucks as in the case of fuel and feed.

The results of a 1982 survey of farm truck uses showing average percentage of annual mileage (distance driven) are presented in Table 6. Although the sample size was relatively small, it was considered to be representative of the farm population in Alberta.[1]

Custom hauling is a very nominal activity, and other non-farm uses for trucks over 6,000 kg (13,225 lb.) appear to be unimportant. Trucks of lighter weight may often be used in place of an automobile for nonfarm purposes.

SECTION IV

FARM TRUCKING ACTIVITY AND COSTS FOR HAULING GRAIN

The transportation and handling systems for grain and grain products in Western Canada are of

[1] Alfred Birch and G. Nabi Chaudhary, "Energy Use for Farm Trucking in Alberta", Economic Services Division, Alberta Agriculture, Agdex 826-1, June 1983, pp. 10-11.

TABLE 6

USE OF FARM TRUCKS: PERCENT OF ANNUAL MILEAGE

Weight Class (kg)	Hauling				Other Non-Farm
	Crops	Livestock	Farm Supplies	Custom	
0- 2,000	10.4	9.8	71.6	0	8.2
2,001- 3,000	10.9	10.3	62.7	0.5	15.6
3,001- 4,000	16.2	11.9	64.1	0.1	7.7
4,001- 5,000	47.7	10.3	32.5	0.5	9.0
5,001- 6,000	51.7	5.2	34.6	0	8.5
6,001- 7,000	46.8	22.6	27.8	0	2.8
7,001- 8,000	62.1	8.6	29.3	0	0
8,001- 9,000	75.6	10.6	13.8	0	0
9,001-10,000	66.0	17.7	15.3	1.0	0
10,001-12,000	68.8	10.9	18.9	0.1	1.3
12,001-14,000	74.6	14.3	9.6	0.5	1.0
More than14,000	79.3	6.5	13.4	0	0.8

extreme importance not only to the prairie region but to Canada as a whole. The production of livestock across Canada relies heavily on the availability of feed grains. Truck transportation has played an important role in the development of the livestock industry in feed deficient areas by hauling grain and grain products from production areas to consumption centres.

During the seventies and early eighties, the trucking industry (commercial and farm) in Alberta has shown a tremendous growth. The number of farm trucks registered with the Motor Vehicle Branch has increased by an average of six per cent per year from 1972-73 to 1982-83. Similarly the numbers of commercial trucks used for hauling grains, feed grains and grain products almost doubled from 1970 to 1979-80.

Role of Farm Trucks in Collection and Delivery of Grain

Farm trucking of grain is an integral part of the entire grain transportation system. The responsibility for transporting grain from the farm to shipping points (primary elevators) and other market outlets has rested with the grain producers. At harvest, farm trucks haul grain from fields to storage on the farm, and in some instances grain is hauled directly from the field to the primary collection points.

Hauling grain from farm storage or field to primary collection points is exclusively by truck, which in most cases is undertaken by the producers themselves. Before the early sixties, farm trucks were considerably smaller and producers had to make several trips to deliver grain to market outlets. However, at that time producers travelled relatively shorter distances to deliver grain compared to now. With the abandonment of rail branch lines and consolidation of country elevators, the distance to grain market outlets has increased significantly. In order to reduce the increasing costs of hauling grain, producers gradually bought larger trucks for a better payload.

Although the one way distance for hauling grain from farms to primary elevators varies greatly, the average was estimated to be about 8 kilometres (5 miles) in Alberta a few decades ago. The average grain hauling distance on the prairies from farms to primary elevators was 12 kilometres (7.7 miles).

With the closure of primary elevators and delivery stations, the average distance for hauling grain in Alberta increased to 18 kilometres (11 miles) in 1974-75 from about 11 kilometres (7 miles) in 1967-68. Trucks (commercial and farm) have played an important role in bringing grain from farms to the primary grain collection points.

Total Costs of Grain Transportation by Farm Truck

No formal survey has been undertaken since 1975 to document farm trucking costs for hauling grain from the field/farm to primary elevators or other market outlets. A survey in 1975-76 obtained information on the cost of transporting grain in Alberta directly from about 200 farmers for the 1974-75 crop year. The cost was divided into two major categories -- fixed and variable costs.[1]

The fixed costs included:

- depreciation
- interest on investment
- license fees
- insurance costs

The variable costs included:

- lubrication cost
- repairs - parts, etc.
- fuel - gasoline/diesel
- maintenance and repair labour
- tires and batteries
- driving labour
- dead-haul labour

A brief description as to how depreciation, driving labour and dead-haul labour costs were computed, is given below:

Depreciation: The diminishing balance method was used to arrive at depreciation costs for the trucks surveyed for the 1974-75 crop year. The average life of a truck was assumed to be 15 years. Some older trucks still in use at that time were allocated 10 per cent of the original price to calculate depreciation.

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[1] G. Nabi Chaudhary, "The Cost of Transporting Grain By Farm Truck in Alberta", Alberta Agriculture, Economic Services Division, Production Economics Branch, Agdex 110/820, August 1977, P. 9.

Driving Labour: Farmers were asked to estimate the average time it took them to make a trip from the farm to the delivery point and other sales outlets and back to the farm. The total driving time for transporting grain was calculated by multiplying the number of trips during that crop year by the travel time for each trip. Driving labour costs were calculated by multiplying the total driving time (hours) spent by the operator, hired worker and family with respective hourly labour charges.

Dead-Haul Labour: The dead-haul labour time was calculated by adding the time taken for loading-unloading grain and waiting time. The total dead-haul labour time was arrived at by multiplying the number of trips hauling grain during the crop year by dead-haul time for each trip. Dead-haul labour costs were obtained by multiplying the respective dead-haul labour time for operator, hired worker and family member by respective hourly wage rate.

The various costs listed above were the common costs for various grain trucks uses. These costs (except driving and dead-haul labour costs) were allocated to grain traffic by using the criterion of "proportion of grain haul miles to annual truck miles".

An important assumption for calculating grain transportation costs for the 1974-75 survey was that each trip to the elevator or other sales outlet was charged to hauling grain. It was further assumed that the farmer did no other business while hauling grain. Round trip distance was included for cost calculation purposes and in calculating grain miles, rather than using only the loaded miles.

The total farm truck grain transportation costs obtained for the 1974-75 crop have been periodically up-dated to the 1983-84 crop year by using Western Canada Farm Input Indicies, published quarterly by Statistics Canada. Although this crude updating procedure does not reflect the changes which have taken place in the grain handling and transportation system, there was no acceptable alternative for developing such costs.

The costs shown in Table 7, except driving and dead-haul labour, are not the total costs for the truck, rather, these are the portions of all costs attributable to the transportation of grain from the farm to the primary elevator and other market outlets.

The average total grain transportation costs per farm truck were $949.96 for the 1983-84 crop year which showed an increase of about 122 per cent over the costs in the 1974-75 crop year. Total fixed costs per truck amounted to $363.09 or 38 per cent of total grain transportation costs.

The largest component of grain transportation costs was depreciation at $217.79 or about 23 per cent of total costs. This was followed by driving labour (15.8 per cent), dead-haul labour (13.92 per cent) and fuel at 13 per cent. Interest on investment amounted to $81.50 (8.6%) of total costs. Fuel and lubrication costs showed the highest increase in 1983-84 over the costs in 1974-75. Details on other variable and fixed costs are presented in Table 7.

TABLE 7

AVERAGE TOTAL COSTS OF TRANSPORTING GRAIN BY FARM TRUCK IN ALBERTA, (1983-84) *

Variable Costs

	Lubric.	Repairs	Tires and Batteries	Maintenance and Repair Labour	Fuel	Driving Labour	Dead-Hual Labour	Total Variable Costs
Dollars	29.09	52.64	39.96	59.40	123.50	150.10	132.18	586.87
Per cent	3.06	5.54	4.21	6.25	13.00	15.80	13.92	61.78

Fixed Costs

	Depreciation	Interest on Investment	License	Insurance	Total Fixed Costs	Total Grain Transportation Costs
Dollars	217.79	81.50	12.57	51.23	363.09	949.96
Per cent	22.93	8.58	1.32	5.39	38.22	100.00

* Costs up-dated from 1974-75 crop year using Western Canada Farm Input Indexes published by Statistics Canada.

Unit Costs of Transporting Grain by Farm Truck

Although significant changes have taken place in grain handling and transportation in terms of the increasing payload of farm trucks, longer hauling distances to primary elevators, and an increase in the volume of grain production since 1974-75, no data have been obtained for bushels of grain delivered or bushel-miles of service and grain miles, etc. Therefore, in order to estimate the 1983-84 unit costs of hauling grain, the 1974-75 data on bushels of grain transported, bushel-miles of service provided and grain miles have been used to arrive at unit costs. Three types of unit costs were calculated, i.e. costs per bushel, costs per bushel-mile and costs per grain mile. The unit costs are shown in Table 8.

On a bushel basis, the average cost of transporting a bushel of grain from the farm to the primary elevator and other market outlet was estimated to be 12.8 cents. Average variable costs amounted to 7.9 cents per bushel where as fixed costs were 4.9 cents per bushel. It was assumed that an average farmer delivered or hauled 7434 bushels of grain in 1983-84, same as in 1974-75.

Average cost per bushel-mile was calculated to be 1.05 cents in 1983-84, up from 0.47 cents in 1974-75. Average variable costs per bushel-mile were 0.65 cents and fixed costs per bushel-mile amounted to 0.4 cents.

On a grain mile basis, the average cost of transporting an average load of grain one mile was 118.8 cents. The average variable costs per grain mile amounted to 73.4 cents and average fixed costs per grain mile were 45.4 cents. During the 1974-75 crop year, average number of grain miles per farm truck was 800 miles (1,280 kilometres) and the same number was used to arrive at 1983-84 farm truck costs.

TABLE 8

UNIT COSTS OF TRANSPORTING GRAIN BY FARM TRUCK IN ALBERTA, 1983-84

Units	Average Variable Cost	Average Fixed Cost	Average Total Cost
	Cents	Cents	Cents
Bushel	7.9	4.9	12.8
Bushel-mile	0.65	0.4	1.05
Grain Mile	73.4	45.4	118.8

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SECTION V

CHARACTERISTICS OF COMMERCIAL TRUCKS IN ALBERTA

Commercial trucking of grain in the sixties was quite minimal involving the movement of rapeseed, grass seed and coarse grains from farms to mills or feedlots. Commercial for-hire trucks were not involved to any great extent in the movement of grain from farms to the local elevator in the past owing to the relatively short haul, limited quotas and elevator space. At some of the old elevators, large trucks encountered difficulties such as unsatisfactory approaches and exits, height and width restrictions, spillage, slow spouting loading capacity, platform scales that were inadequate for heavy loads and positioning of trucks, etc.

Commercial trucks offer some cost savings over farm trucks and have been used to some extent where length of haul is quite long. The large capacity equipment operated by commercial truckers appears to some producers to be more efficient than the small trucks they operate. Commercial truckers are also used by producers who either cannot afford to own large capacity equipment or cannot commit the time to deliver their own grain when required.

Commercial trucks have been part of various exercises undertaken by the Canadian Wheat Board and private grain companies to expedite grain shipments to export positions. Trucks have been used in connection with experimental programs to determine the feasibility and desirability of using inland terminals in combination with unit trains/solid trains to ship grain to domestic or export positions.

Regulations Governing the Commercial Grain Trucking in Alberta

Regulation of motor carriers has traditionally been the responsibility of provincial governments. Under The British North America Act, the federal government was empowered to regulate extra-provincial transportation. However, the federal government's powers of regulation were formally delegated to the provinces under the Motor Vehicle Transport Act of 1954.

For regulatory purposes, the provinces have divided the motor carrier industry into the following two broad jurisdictional categories:

(a) Intra-provincial motor carrier operation -- a for-hire motor carrier whose entire business undertakings are confined within the boundaries of one provincial jurisdiction, i.e., does not transport goods outside provincial boundaries.

(b) Extra-provincial motor carrier operation -- a for-hire motor carrier whose business undertaking involves transporting goods between two or more provincial jurisdictions, i.e., transport goods across provincial boundaries or into the United States.

The Public Service Vehicle Act of Alberta empowers the Alberta Motor Transport Board to regulate the trucking industry in Alberta. Under the Motor Vehicle Transport Act, Section 37, "no person may operate a public vehicle on a highway for the purpose of transporting goods .... unless the operation is carried out pursuant to the authority

of an operating authority certificate or an exemption has been obtained ...."[1].

Under the act, a "public vehicle means a vehicle operated on a highway by or on behalf of a person for the tranportation of goods ...."[2], and goods means anything that is or may be carried by means of a vehicle and for the transportation of which compensation is payable ....[3].

Intra-Provincial Motor Carrier

In Western Canada, Alberta may be described as "non-regulator" with respect to intra-provincial trucking as it allows the intra-provincial trucking industry in the province to operate in a free enterprise environment with minimal regulation. As a result the procedure involved in obtaining intra-provincial operating authority and commencing a for-hire trucking operation is relatively simple. The Motor Transport Board stipulates the following minimal requirements that must be met in order to obtain intra-provincial operating authority:

- purchase of a Public Service Vehicle license plate
- show proof of insurance
- posting of a fidelity bond

Prior to issuance of authority to operate as an intra-provincial carrier, the application must be ratified by the Motor Transport Board, however, this procedure is strictly a formality and less than one per cent of all applications are rejected.[4]

Any properly licensed resident of Alberta meeting the above three basic requirements can commence an intra-provincial for hire operation in Alberta with no restriction respecting routes, rates, commodity transported or equipment.

Extra-Provincial Motor Carrier

With respect to extra-provincial hauling, under powers conferred on the Alberta Motor Transport Board by the Federal Motor Vehicle Transport Act, the regulatory environment in Alberta for commercial trucking is somewhat similar to that of other provinces. That is, there is entry control, but with respect to grain hauling, there are no economic regulations in terms of service, rates, etc.

An extra-provincial motor carrier (resident or non-resident) must apply to the Motor Transport Board for authority. Restrictions (routes, commodities, areas, shippers, etc.) may be placed on this authority and the board may issue a permit to a non-resident owner of a vehicle who:

a) has complied with the law of his/her place of residence as to the registration of motor vehicles, and

b) desire to operate the public vehicles for a single conveyance of goods .... and specify conditions to which the permit is subject.[5]

The board may issue special permits (in place of operating authority certificates) "in any instances

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1 Alberta Motor Transport Act, Section 37.

2 MTA, Section I (v)

3 MTA, Section 1 (g)

4 Report of the Select Committee of the Legislative Assembly, "Reviewing Intra-Provincial Trucking Regulations", Alberta, March, 1977, P.23.

where the operation of a public vehicle is otherwise prohibited under the Act," and may specify:[6]

- the duration of special permits, and
- the conditions to which the special permit is subject.

Alberta's regulations governing commercial grain hauling are:

	Entry Controls	Rate Controls	Service Controls
Intra-Provincial	not controlled	not controlled	not controlled
Extra-Provincail	controlled	not controlled	not controlled

Commercial Grain Trucking Fleet Size And Operating Characteristics

Data on intra-provincial commercial grain trucking are not readily available. The operating authority records are of little value in identifying intra-provincial carriers because they are not restricted to grain hauling or any other particular commodity. Therefore, it is not possible to identify which or how many carriers are in intra-provincial grain hauling. However, the authority's records do serve as an indicator of the number of extra-provincial carriers, although there are some factors limiting their usefulness.[7]

- "non-complimentarity" (i.e., holding an extra-provincial authority in one jurisdiction which is not complemented in another).
- "non-exercise" (i.e., holding appropriate authority but not exercising it).
- "authority cascading" (i.e., grain being encompassed within another, broader, authority term).
- 1 trip permitting (i.e., authorizing operations by -trips or time-limited permits only, issuing no formal (recorded) authority).
- "mid-night permitting" (i.e. non, or loose enforcement).

These are some of the shortcomings in the authority records with the Alberta Motor Transport Board. However, for the purposes of this study, the board's records have been relied upon to determine the size and various characteristics of commercial trucks for extra-provincial grain hauling. As indicated above, it is impossible to isolate commercial trucks for intra-provincial grain hauling.

The list of authorities obtained from the Alberta Motor Transport Board showing extra-provincial movements of grain or grain products has shrunk considerably and contains the names of only 31 carriers. Four carriers have two authorizations each. The authorities showed that 26 carriers were Alberta domiciled, three were from British Columbia and two from Saskatchewan. The commodities listed on the authorities are processed grains, grains unmilled and seed. Table 9 presents the operating authority certificate report on commercial truckers licensed to haul grain and grain products extra-provincially.

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5 MTA Section 19

6 MTA Section 20

7 Clayton, A., Nix, F., and Sparks, G., "Aspects of Commercial Trucking of Grain in the Prairie Region: Fall 1982", Research Branch, Canadian Transport Commission, May 1983, p. 40.

Alberta Commercial Grain Trucking Fleet Size:

Commercial grain truckers owning extra-provincial authorities were contacted to obtain information on the fleet size, areas served, utilization of equipment, configuration of equipment, other dry bulk freight hauled, rates, and back-haul situation, etc. Discussion under this sub-section concentrates on size of the fleet and configuration of equipment.

It was difficult for some carriers to pinpoint the exact number of grain trailers/A-trains/B-trains used for hauling grain or grain products intra- and extra-provincially. Because of the versatility of the equipment, its uses included hauling other dry bulk commodities and products.

Table 10 presents a summary of estimated fleet of hopper-bottom units operated by carriers with intra- and extra- provincial authorities.

In addition to the carriers and equipment presented in Table I0, it is estimated that there is a large number of one to two truck operators in Alberta. Because of the deregulated nature of intra- provincial grain hauling, it was difficult to estimate the number of such carriers and equipment operated by them.

Several carriers and other sources dealing with commercial truckers estimate the number of grain trailers (semis, A-trains and B-trains) in Alberta could be between 200 and 250 which is about three times lower than in the late seventies. Carriers contacted indicated that there are other carriers hauling grain and grain products under the classification of bulk commodities. Most of these

TABLE 9
OPERATING AUTHORITY CERTIFICATE REPORT ON COMMERCIAL TRUCKERS LICENSED TO HAUL GRAIN AND GRAIN PRODUCTS EXTRA-PROVINCIALLY*

	Hauled	Number of Authorities	Number of Authorities in use in 1984	Orgin	Destination
1.	Processed Grain Products	17	9	All points in Alta.	All points in B.C.
			1	All points in B.C.	All points in Alta.
2.	Grains Unmilled	13	2	All points in B.C.	All points in Alta.
			9	All points in Alta.	All points in B.C.
3.	Seed Grain	1	1	All points in Alta.	All points in B.C.
4.	Grain Processed For Feed	4	4	All points in Alta.	All points in B.C.
	TOTAL	35	26		

*Information obtained from Alberta Motor Transport Board, Red Deer, Alberta.

TABLE I0

HOPPER-BOTTOM FLEET FOR INTRA- AND EXTRA-PROVINCIAL HAULING OF GRAIN AND GRAIN PRODUCTS, I984-85

	No. of Carriers	Semis	A-Trains	B-Trains	C-Trains	Total
Carriers Contacted	24	107	23	40		I70
Carriers Identified by Others	7	12	3	8		23
TOTAL	31	II9	26	48		I93

carriers were not Alberta domiciled therefore no contact was made with them.

The tractor semi-trailer five-axle units, which dominate the fleet, range between 38 to 42 feet in length. Some of these semis have special features, like interchangeable 2, 3, and 4 feet sides, sliding tandem axles, complete tarping protection, which can be used for hauling general commodities, palletized and bagged commodities. In terms of payload for these units, estimates varied considerably from 30,000 lb. to 45,000 lb.

Operating Characteristics: The carriers contacted were also asked to provide general information on the operating characteristics of their fleet. Specific questions on operating characteristics included grain hauling patterns (areas served), types of commodities (dry bulk) hauled other than grain, annual utilization of equipment, back-haul rates, etc.

Grain Hauling Patterns: About half of the carriers contacted hauled grain and products intra-provincially both in Alberta and British Columbia. Fourteen carriers moved processed feed grains or unmilled grains to the States, most commonly to Washington, Idaho, Montana, California and others. Four carriers hauled feed grains to Saskatchewan and Manitoba as a back-haul as well as front-haul.

For some of the carriers, local hauling (intra-provincial) was between farms, country elevators and feed mills. Three carriers indicated contract hauling for grain companies and rapeseed crushing plants and feed mills in the province.

A few carriers reported a considerable drop in the grain traffic because of competition among the carriers and poor production in I984. Most of the Alberta feed grains shipped by truck to British Columbia were for domestic consumption. Since the introduction of contract rates by the railways on feed grains, the truckers' share has been on the decline.

Most of the carriers could not provide an accurate account of the number of loads of grain carried intra- and extra-provincially during I984. Therefore, no attempt was made to generalize this information.

Types of Commodities Hauled: The carriers were asked to provide information on the types of commodities hauled with the equipment used for hauling grain. Because of the versatility of the equipment, other commodities hauled included fertilizer, paper, lumber, and general merchandise, and as one carrier put it "anything which is possible to load and unload". A few carriers hauling perishable produce from the States reported using semis equipped with refrigeration units hauling feed grains as back-haul to the States.

Most Alberta-based carriers hauled grain, grain products and fertilizers to British Columbia and the provinces to the east, and hauled non-farm commodities as back-haul. Grain hauled by these carriers was mostly non-board and most of the movements were primary i.e., off the farm. Most of the destinations were other than primary elevators i.e , processing plants, terminals and feed mills.

Annual Utilization of Equipment and Back-Haul: Annual utilization of grain related equipment was determined in terms of annual kilometres (miles) per unit. It was difficult to obtain specific information, particularly when the equipment was being used for non-grain traffic as well. However, carriers were asked to provide an estimate of annual mileage per unit. It was not possible to get this information from all carriers.

Two Alberta-based carriers estimated that they averaged about 96,000 to 120,000 kilometres/trailer/year in 1984. Another carrier estimated 160,000 to 180,000 kilometres/trailer/year for the grain related equipment of which about 40 per cent was for grain and grain products. Another Alberta carrier hauling grain and grain products intra- and extra-provincially to British Columbia hauled about 360 loads of grain in A-trains and about 200 loads in semis.

Carriers hauling grains intra-provincially reported over 50 per cent running empty on back-hauls. Extra-provincial carriers reported 5 to 20 per cent being empty on back-hauls, depending upon the area serviced and length of haul. Two carriers hauling to and from the States reported very little empty back-haul as they always found some products to haul, although back-haul rates did not always cover operating costs of the unit.

One Alberta carrier hauling perishables from the States in refrigerated semis reported hauling 20 loads of feed grain as back-haul in 1984, with an average load of 19,510 kg (43,000 lb). The back-haul rate reported by this carrier to California was about $54/tonne ($2.45 per cwt) which is less than 40 per cent of the front-haul rate. This carrier commented that the shippers pretty well dictate the back-haul rate. Sometime the carrier is told "take it or leave it" because there are several other carriers competing for the same load. Average annual mileage on this carrier's equipment was about 240,000 kilometres/trailer/ year.

Several carriers pointed out that there is currently wide-scale underutilization of the existing equipment available for commercial grain trucking in Alberta and on the Prairies. A few of the obvious reasons for underutilization of equipment are wide fluctuations in production, competition among carriers, competition with the railways and the down-turn in the economy.

Development of Commercial Trucking in the Grain Industry

Using commercial trucks to haul grain from the farm and/or from the primary collection points to central shipping areas (terminals) increased significantly during the early seventies. It peaked from 1976 through 1981. The increase in commercial grain trucking activities could be attributed to several factors: consolidation of primary elevators; abandonment of rail branch lines; relaxation of vehicle weight and dimension regulations; and the development of a hopper bottom fleet. The relaxation of maximum weights, lengths and other highway legal limits inspired the trucking industry to increase payloads significantly and improve overall transportation efficiencies. All these developments over the past two decades have made commercial trucking an effective mode of transportation. Trucks are competing successfully with railways on medium and some long hauls. Since the early seventies, commercial trucks have taken over short haul or intra-provincial traffic.

Use of Commercial Trucks by the Canadian Wheat Board

The Canadian Wheat Board (CWB) undertook some test hauls involving commercial trucks to expedite the shipment of grain to export positions in 1971-72. The test project involved the movement of barley by commercial trucks from primary elevators to the federal government terminals at Moose Jaw and Saskatoon. During the ten week test period, i.e., May 23 to July 31, 1971, a total of 122,397 tonnes (5,621,700 bushels) of barley was trucked from country elevators to the two terminals. The entire operation was completed successfully.

Since the 1971-72 crop year, commercial trucks have been serving as feeder to the railways in the Prairie region. Rail line abandonments and closure of country elevators increased the demand for truck services.

Before the 1973-74 crop year, commercial truck uses for hauling grain in Alberta were limited to serving feed-mills, seed plants and feed-lots. After examining grain shipment by truck from primary elevators to interior terminals in Saskatchewan, the CWB attempted test hauls in Alberta during the 1973-74 crop year.

The objective of the test hauls was to overcome delays caused by strikes and shortages of boxcars, and also to test the reliability of using commercial trucks for unit train operation. Grain was moved from branch line points to the interior terminals using commercial trucks to speed up rail shipments.

Commercial trucks used in the test haul carried 18 to 24 tonnes (700 to 900 bushels of barley). All of the units were the self-unloading type and were licensed as commercial vehicles "Class C". Initially, the carriers were authorized to haul grain within 320 kilometres (200 miles) radius from the terminal points at Edmonton and Lethbridge. However, the above limit was reduced to 160 kilometres (100 miles) because of the cost factor.

The trucking program relieved the rail cars which were usually tied up on the tracks either at the country elevators or at the terminals. Injection of truck service expedited grain movement to the ports in time. One estimate showed that during

the test haul period rail cars took seven days from Lethbridge to Vancouver and back. Earlier the same cars used to take 12 to 15 days for a return trip.

During the 1973-74 crop year, the trucking program in Alberta moved 49,262 tonnes (1,810,094 bushels) of wheat, and 53,071 tonnes (2,437,548 bushels) of barley from country elevators to interior terminals in Edmonton. A total of 178,206 tonnes (6,547,992 bushels) of wheat were transported to the Lethbridge terminal. Over 280,500 tonnes (10.7 million bushels) of wheat and barley were hauled to the two terminals by truck for the board in the 1973-74 crop year. The Calgary terminal was not used by the board as it was occupied by oilseed and other grain.

The cost of trucking grain to interior terminals in 1973-74 was $3.92 per tonne (6.1 cents per bushel). Other costs like diversion charges, interior terminal handling, weighing and inspection were $1.98 per tonne (3.1 cents per bushel) for grain shipped to inland terminals.

Commercial trucks expedited the grain shipments, as grain was dried, cleaned and graded at the inland terminals and was shipped via unit trains to seaports using modern hopper cars. Where as rail boxcar which usually took about ten days to move from country elevator to an inland terminal was able to make the round trip in 8 to 10 hours to move the same amount of grain. Trucking of grain to inland terminals lead to better utilization of available railway equipment.

A strike by blue-collar workers at the seaports resulted in the suspension of commercial trucking of grain, and since then no such attempt has been made to revive that program. Commercial trucks have been hauling non-board grain to inland terminals for further shipments and to the feed mills, processing plants and ranches.

Intra-Provincial Rates/Costs of Transporting Grain by Commercial Trucks

Commercial grain trucking rates presented in Table 11 have been obtained from the Western Tariff Bureau. For both intra- and extra- provincial movements the carriers are free to set their own rates. The published tariffs set out certain conditions and charges which are usually considered as guidelines. Only those carriers following these guidelines are party to a particular tariff. Some of the established carriers have their own tariffs for quoting rates. However, these rates can be further negotiated depending upon the business volume, routing, loading and unloading facilities, etc.

A few contract carriers hauling grain and grain products for grain companies and other grain processing organizations negotiate rates for a certain duration and these are strictly followed. In addition to the negotiated rates, other grain hauling conditions are also stipulated in the respective companies' tariffs.

The commercial grain trucking rates published by the Western Tariff Bureau on behalf of the participating carriers are presented in Table 11. These rates, which apply to the intra-provincial

TABLE 11

INTRA-PROVINCIAL COMMERCIAL TRUCK TRANSPORTATION RATES ON GRAIN AND GRAIN PRODUCTS

From: Points in Alberta

To: Calgary, Edmonton and Lethbridge, Alberta

Distance in Kilometres	Rates in Cents Per Tonne
0 to 48	572
49 to 64	650
65 to 80	702
81 to 97	780
98 to 113	832
114 to 129	937
130 to 145	989
146 to 161	1067
162 to 177	1119
178 to 193	1197
194 to 209	1274
210 to 225	1352
226 to 241	1404
242 to 257	1483
258 to 274	1535
275 to 290	1639
291 to 306	1691
307 to 322	1769

Note 1: Minimum charge will be the charge for 20.41 tonnes.

Note 2: It shall be the shipper's responsibility to furnish loads and arrange consignee's acceptance in quantities that will occupy the full capacity of the units, usually 22.68 tonnes.

Note 3: For farm pick-ups add $2.20 per tonne.

movement of grain, have not been increased since May 1982. The main reasons are:

- too many carriers for the same load (severe competition)
- considerable drop in the volume of grain available for trucking
- farmers buying into larger trucks and increase in custom hauling
- 1984 being the worst year for grain production; etc.

Efficiency of Commercial Trucking Versus Farm Trucking

Commercial trucks appear to be more efficient compared with farm trucks because of the difference in payload. Farm trucks are usually smaller in size and cannot transport large loads thus incur higher costs per unit. A survey of farm trucks in the early seventies indicated the average size of a farm truck box to be 6.2 tonnes (249 bushels). Although there are large farm trucks with bigger boxes, more than 75 per cent of farm trucks are in a weight class of less than 10,000 kg (22,040 lb.) gross vehicle weight.

A comparison of commercial and farm truck costs shows that commercial trucking is less expensive than farm trucking on longer hauls. With the changes taking place in the grain handling and transportation system, the use of larger trucks will become inevitable if transportation efficiencies have to be achieved. Longer hauls and an increase in production of agricultural commodities will require the use of fuel efficient vehicles to reduce the number of trips and lower overall transportation costs. Commercial or custom trucks may not be useful on a day-to-day basis, but they can certainly be helpful in transporting large loads at a relatively lower cost compared to a small farm truck.

A farm truck operator's ability to reduce transportation costs is determined by a variety of factors such as the average payload carried, the maintenance of the truck, distances to travel, number of trips to be made, etc. With the increase in hauling distances for the delivery of grain to market outlets, trucks with smaller boxes would become expensive to operate as more time must be spent on the road and in maintenance. Moreover, it decreases the useful life of the truck, thus increasing the depreciation and interest costs as well.

A simple cost comparison between a farm truck with 6.2 tonne (249 bushel) box capacity and a commercial truck-trailer with about 20 tonne (800 bushel) capacity, shows that the latter is cheaper over a longer distance. Therefore, as the distance increases, it is more economical to use commercial and/or custom truckers than small size farm trucks. Although a trend is developing in favour of purchasing bigger trucks by farmers, it will take a long time to replace the present fleet of farm trucks. Given the present economic conditions and farm product prices, most farmers are better off to postpone investment in new and heavier trucks and should consider the use of commercial or custom truckers.

According to estimates for farm truck grain hauling in 1983-84, it cost a grain producer about $5.12 per tonne (12.8 cents per bushel) to deliver a load of 7.5 tonnes (300 bushels) for an average

distance of 18 kilometres (11.1 miles). These costs increased to $6.72 per tonne (16.8 cents per bushel) for a distance ranging from 19 to 24 kilometres (11.8 to 15 miles).

Costs for hauling grain by farm and commercial truck are:

	Farm Truck		Commercial Truck
Box capacity	6.2 tonnes		20 tonnes
Average distance:	18 km	$5.12/t	$5.72/t*
	23 km	$6.72/t	$5.72/t*
	48 km	$9.20/t	$5.72/t*

* Add $2.20 per tonne for farm pick-up.

A cost comparison between a farm truck and a commercial truck shows that the former is cheaper for short distance deliveries. However, to deliver the same volume of grain as with a commercial truck in one trip, the farm truck owner would have to make about three trips. As the hauling distance increases, the commercial truck offers cost saving over an average farm truck. If the payload can be increased on a commercial unit by using A or B-trains, higher savings can be realized.

The grain hauling rates given above should be used as a guide for estimating trucking costs. Better rates can be negiotiated depending on business volume, loading, unloading and road conditions.

Transportation of Feed Grains to British Columbia

Livestock and poultry production in British Columbia has been dependent on feed grain supplies from outside the province. Production is centred in the lower mainland, southern interior Okanagan and Vancouver Island regions. Since these regions are almost entirely grain deficient, producers have to rely on supplies of feed grains from distant areas. In order to assist these producers, the federal government introduced a Feed Freight Assistance (FFA) program in 1940 which subsidizes a portion of the transportation costs of feed grains to be used by livestock feeders. This FFA program is administered by the Livestock Feed Board of Canada.

A recent study completed by the Grain Transportation Task Force for the Livestock Feed Board of Canada provides detailed information on movement of feed grains to British Columbia by mode, type and origin. Selected information from this report has been used here to describe the commercial trucking activity for hauling feed grains and grain products to British Columbia.[8]

The British Columbia Feed industry is heavily dependent upon feed grain supplies from Alberta. Most of the feed grains transported to the lower mainland of British Columbia under the FFA program comes from Alberta and the Peace River region of British Columbia. Lesser amounts originate from other Prairie areas and the west coast terminal elevators.

The origin of feed grains and products transported to British Columbia under the Feed Freight Assistance (FFA) Program are shown in Table 12. The terminal elevator amounts represent purchases from the Canadian Wheat Board of

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[8] The Grain Transportation Task Force, "Transportation of Feed Grains To British Columbia", Livestock Feed Board of Canada, January 1984.

wheat, oats and barley and screenings moved from Vancouver terminals under FFA.

The figures in Table 12 show the dominance of Alberta as a source of feed grains for British Columbia. Prior to the crop year 1974-75, the domestic sales of feed grains from the Prairies was under the control of the Canadian Wheat Board (CWB). Feed grains from the Peace River region of B C. for domestic use were not subject to CWB jurisdiction and were used in large quantities because of the competitive pricing structure used. At the start of the 1974-75 crop year changes were made to the Domestic Feed Grains Policy and British Columbia producers were allowed direct access to the Prairie feed grain market. Since that time there has been a decline in the percentage of feed grains obtained from the Peace River region.

The percentage of wheat, oats and barley transported to B.C. from Alberta, the Peace River region of B.C. and the West Coast terminals, under the FFA program, are shown in Table 13.

Commercial Trucking Activity for Transportation of Feed Grains to British Columbia

During the seventies the trucking industry showed a tremendous growth and captured a significant share of the extra-provincial movement of feed grains and grain products, and has almost replaced rail for the intra-provincial movement of agricultural products. A shortage of railway equipment, high operating costs, and higher domestic freight rates provided truckers with opportunities to haul feed grains and grain products to British Columbia, eastern Canada and the U.S.A. The commercial truckers took advantage of the situation and increased their share of feed grain shipments to British Columbia.

Since 1978, the railways have made determined efforts to get back part of the traffic lost to truckers by offering competitive rates in the form of contract rates. These rates are discussed in the following sub-section. Figures in Table 14 show that rail has again become the dominant mode of transport for the movement of feed grains to British Columbia from the Prairies. The percentage transported by truck has changed significantly during the last 10 years. Movement by truck increased through to the 1977-78 crop year and then declined when the railways established "truck competitive" rates from the main shipping points.

The supply of feed grains to British Columbia in the 1982-83 crop year is illustrated in Figure 4, which shows the areas of origin, the transportation modes and the regulatory bodies involved. The main regulatory bodies are the Canadian Wheat Board (CWB), and the Grain Transportation Agency (GTA). The GTA and CWB regulate shipments of feed grains transported by the elevator system.

Alberta is the major supplier, providing 66 per cent of the feed grains and over 90 per cent of the wheat, oats and barley used in British Columbia. Approximately 10 per cent of the wheat, oats and barley is shipped direct from farms to nonlicensed elevators. These shipments are by truck and are not subject to the quota system of the CWB. The balance of shipments are from the elevator system, and move by truck or rail. Grain entering the elevator system is subject to the CWB quota system

and rail shipments are regulated by the GTA and CWB.

During the 1982-83 crop year approximately 0.37 million tonnes of wheat, oats and barley were transported from Alberta to the lower mainland domestic market with approximately 65 per cent or about 0.25 million tonnes moved by rail.

Truck transport, direct from farm or from the elevator system, does provide an alternative to rail movement. However, there are limitations to the amount of grain that can be transported by truck. These limitations include:

- the seasonal nature of grain availability direct from the farm, owing to weather and supply problems,
- grain is "back hauled" by trucks and the number of trucks available varies depending on the demand for primary loads,

TABLE 12

FFA* MOVEMENT OF FEED GRAINS TO BRITISH COLUMBIA BY TYPE AND ORIGIN ("000" TONNES)

	-Wheat/Oats/Barley-			Corn	Screen	Mill Feed	
	Alberta	Peace	Terminal	Man.	Term.**	Alta.	Total
Crop Year							
82/83	370.0	19.1	2.2	50.8	3.0	44.2	489.3
81/82	397.3	23.3	3.2	81.4	2.6	45.5	553.3
80/81	361.9	37.8	8.6	15.7	3.5	39.3	466.8
79/80	368.4	31.0	4.9	29.5	4.9	32.6	471.3
78/79	330.0	27.9	3.7	20.3	2.9	41.5	426.3
77/78	219.6	25.9	4.6	6.2	7.7	43.9	307.9
76/77	167.7	33.8	7.8	0.0	6.7	39.7	255.7
75/76	149.7	53.6	8.6	0.0	5.1	49.4	266.4
74/75	196.4	31.5	6.8	0.0	6.0	40.4	281.1
73/74	139.4	113.8	32.6	0.0	5.8	29.5	321.1

*FFA (Feed Freight Assistance)

**Screenings Terminal - Screenings from Vancouver Terminal transported to Zone I (Okanagan/Kootenays) and covered under the Feed Freight Assistance program.

TABLE 13

MOVEMENT OF WHEAT, OATS AND BARLEY TO BRITISH COLUMBIA BY ORIGIN (% OF TOTAL)

Crop Year	Alberta	Peace River Region of B.C	West Coast Terminal
		------- Wheat/Oats/Barley ------	
1982-83	94	4	2
1981-82	93	5	2
1980-81	88	9	3
1979-80	91	7	2
1978-79	91	7	2
1977-78	87	10	3
1976-77	80	16	4
1975-76	70	25	5
1974-75	81	15	4
1973-74	48	39	11

the physical limitations at feed manufacturing plants to handle all of the trucks if no rail transport is available.

Comparison of Rail and Truck Rates on Feed Grains to British Columbia

Prior to the sixties and early seventies, railways had a monopoly over the transportation of feed grains and grain products to the feed deficient areas of British Columbia. The rates charged by the railways during those years were considerably higher and reflected the captive nature of this traffic.

During the early seventies, the development of motor trucks with increased payloads and faster turn around time provided some competition to the railways. In the 1970-71 crop year, share of trucks in transporting subsidized feed grains and grain products from the Prairies and other areas to British Columbia was 6 per cent only. It increased to 11.5 per cent during the 1972-73 crop year and to 14 per cent in the 1973-74 crop year. The share of truck traffic continued to increase and peaked to 56.1 per cent in 1976-77 (Table 14). In 1977-78, the truck share of the feed grains and grain products traffic declined to 52.8 per cent as a result of railways establishing "truck competitive" rates from the main shipping points. During the following crop year, i.e., 1978-79, the percentage of this traffic carried by trucks declined to 38.8 and

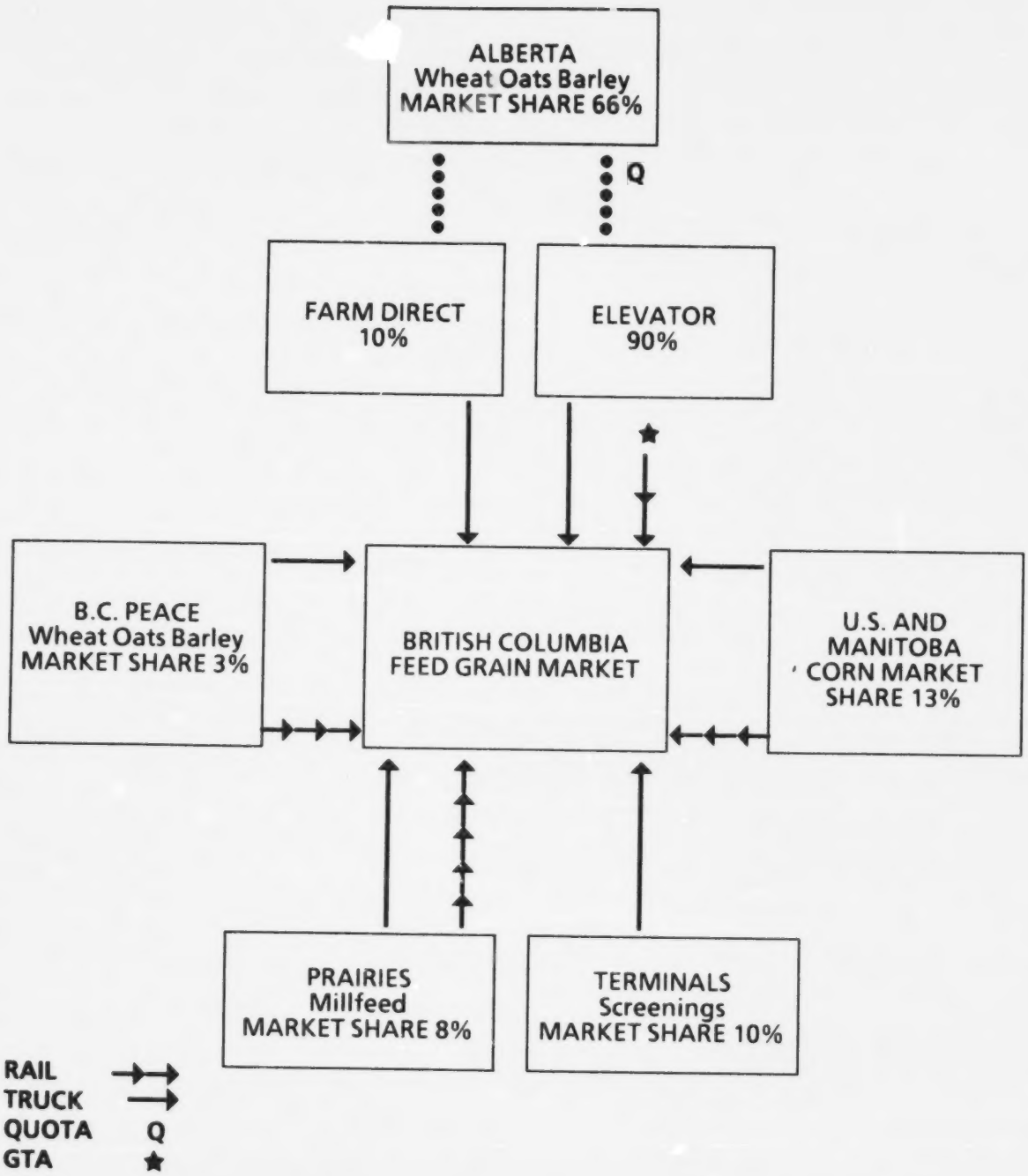

FIGURE 4 SUPPLY OF FEED GRAIN TO B.C. BY AREAS OF ORIGIN

has continued a downward trend. During the 1982-83 crop year, the truck share of feed grain traffic was 30.7 per cent and is expected to remain around 30 per cent for several years to come.

Rail rates on feed grains and grain products from Calgary and the Peace River District to British Columbia are presented in Table 15. Both the railways, CN Rail and CP Rail substantially reduced their freight rates in 1969 and moderately in 1970. These rates went up marginally 1971 and remained at that level for the next two years. In 1974, these rates increased by about 6 per cent, and by about 20 per cent in 1975, and remained at that level through 1977 and first two months of 1978, primarily because of the competition with truckers. On March 1978, rail rates were reduced from $18.74 per tonne to $16.31 to selected destinations in the Fraser Valley and the interior by CN - CP Rail in an attempt to gain back the traffic lost to truckers over the past few years. The average truck rate from the Calgary area to Fraser Valley points was $18.74 per tonne and the railways successfully recovered a sizeable volume by reducing their rates from various selected origins between Calgary and Edmonton at their reduced $16.31 tonne rate.[9] These rates were increased marginally in 1979, but in 1980 substantial increases were implemented to bring rates somewhat at par with truckers. These rates have been rising steadily since 1980 and are competitive with truck rates.

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[9] _____, Canadian Livestock Feed Board, Annual Report, Crop Year, 1977-78, p. 12.

TABLE 14

PERCENTAGE MOVEMENT OF FFA FEED GRAINS TO BRITISH COLUMBIA FROM PRAIRIES BY MODE OF TRANSPORT

Crop Year	Truck	Rail
1982-83	30.7	69.3
1981-82	27.9	72.1
1980-81	29.3	70.7
1979-80	32.2	67.8
1978-79	38.8	61.2
1977-78	52.8	47.2
1976-77	56.1	43.9
1975-76	40.4	59.6
1974-75	21.5	78.5
1973-74	14.0	86.0

TABLE 15

RAIL RATES ON FEED GRAINS TO SELECTED DESTINATIONS FROM 1967 TO 1985 ($ PER TONNE)

From: Ex. B.C., Peace River District and Calgary To:	1967		1968		1969		1970		1971		1972[1]	
	Peace River	Calgary	Peace River	Calgary	Peace River	Calgary	Peace River	Calgary	Peace River	Calgary	Peace River	Calgary
Kamloops, B.C.	18.96	12.56	18.96	13.22	11.90	11.90	10.14	9.26	10.58	9.70	10.58	9.70
Vancouver, B.C.	17.19	15.87	17.19	16.53	14.33	14.33	15.43	14.33	15.87	14.77	15.87	14.77
Victoria, B.C.	18.07	16.75	18.07	17.52	15.32	16.09	16.53	16.09	16.97	16.53	17.30	16.97

From: Ex. B.C., Peace River District and Calgary To:	1974		1975[2]		1979		1980		1981		1982	
	Peace River	Calgary	Peace River	Calgary	Peace River	Calgary	Peace River	Calgary	Peace River	Calgary	Peace River	Calgary
Kamloops, B.C.	11.24	10.36	13.45	12.35	13.66	12.57	31.53	15.21	35.71	17.20	36.60	20.50
Vancouver, B.C.	16.98	15.65	16.98	18.74	17.20	16.53	22.05	21.83	25.57	22.05	25.57	26.01
Victoria, B.C.	18.52	17.64	18.52	21.16	18.74	21.61	28.88	26.01	32.63	30.20	33.29	36.83

From: Ex. B.C., Peace River District and Calgary To:	1983		1984		1985	
	Peace River	Calgary	Peace River	Calgary	Peace River	Calgary
Kamloops, B.C.	39.42	19.62	41.39	20.60	43.05	21.42
Vancouver, B.C.	27.56	27.56	28.94	28.94	30.10	30.10
Victoria, B.C.	38.37	38.58	40.29	40.29	41.90	41.90

1 Same rates for 1973.

2 Same rates for 1976 to 1978.

Commercial Truck Rates to British Columbia:

As discussed in Section V, commercial feed grain trucking rates are unregulated for both intra- and extra-provincial movements. Thus, there is no regulatory source of data on feed grain hauling rates for shipments to British Columbia. The rates presented below have been obtained from a carrier tariff and from carriers who were contacted to obtain information on grain trucking fleet size and the characteristics of the fleet for shipping feed grains and grain products to British Columbia. Readers are cautioned that truck rates published in a carrier tariff have no particular status as the participating carriers are free to set their own rates as they see appropriate. Rates published in a tariff are used as guidelines and a participating carrier would not charge more than the published rates. However, if a carrier is guaranteed a certain business volume over a time period, there is a good possibility of negotiating a lower rate.

The truck rates presented in Table 16 indicate that although these rates were slightly higher than the rail rates (Table 15), they provided severe competition to the railways during the mid-seventies. The increased competition from the truckers could be attributed to inadequacy of railway equipment, turn around time required for railway cars, efficient service provided by truckers, and to some extent the consideration for freight rates.

Truckers share of subsidized feed grains and grain products movement increased to over 56 per cent in the 1976-77 crop year. It dropped to about 53 per cent in 1977-78, and fearing the erosion of rail service for domestic grain shipments, the railways decided to reduce their rates on March 1, 1978 for feed grains shipped under the FFA program. In the following crop years the truckers' share declined considerably and has been around 30 per cent since 1979-80.

As shown in Table 16, truck rates on feed grains and grain products to British Columbia have not been increased since 1982. The main reasons for hauling feed grains at the 1982 rates are that there are too many carriers for the same load, and competition with the railways. Rail rates have played a major role in recapturing grain traffic from the truckers.

SECTION VI

ROAD EXPENDITURES AND RELATED ISSUES

Alberta is well served by a system of primary highway, secondary and local roads. The primary highway and secondary road network is shown in Figure 3 in Section II. The secondary road system covers most of the province and provides direct access to the paved all-weather roads. The objective of this chapter is to examine expenditures by various levels of governments on road construction and maintenance, and the adequacy of the road network to serve grain producers in the province. It is also, to evaluate the impact of increased trucking activity on the provincial road network and to determine any additional expenditures for proper maintenance.

TABLE 16

COMMERCIAL TRUCK TRANSPORTATION RATES ON GRAIN PRODUCTS: IN BULK OR SACKS ($ PER TONNE)

	June, 1971		June, 1973		Nov., 1973		Aug., 1975		Aug., 1976		Jan., 1979	
From:	Calgary	Edmonton	Calgary	Edmonton	Calgary	Edmonton	Calgary	Edmonton	Calgary	Edmonton	Calgary	Edmonton
To:												
Kamloops, B.C.	11.92	13.95	12.87	15.08	14.24	16.68	16.75	19.62	17.85	20.72	19.01	22.07
Vancouver, B.C.	14.99	18.29	16.09	19.40	17.63	21.38	20.28	24.68	20.28	24.68	21.60	26.23
Victoria, B.C.	26.01	29.31	27.11	30.42	29.75	33.50	34.16	38.57	36.37	40.77	38.57	43.20

	Sept., 1980		Feb., 1982	
From:	Calgary	Edmonton	Calgary	Edmonton
To:				
Kamloops, B.C.	20.91	24.28	26.18	30.13
Vancouver, B.C.	23.81	28.88	29.76	36.10
Victoria, B.C.	42.55	47.62	53.19	59.53

Source: Western Tariff Bureau, Tariff No. 875.

Government Expenditures on Road Construction and Maintenance

Before discussing the road construction and maintenance expenditures, it would be useful to discuss the jurisdictional responsibilities of different types of roads.

Local Roads: The main purpose of local roads is to provide access to abutting properties. In rural areas, local roads are paid for on an "at large" basis, they are not assessed directly to the frontage of the parcels they serve, but are paid for out of the municipal portion of the mill rate available to the total rural jurisdiction.

Collector Roads: These collect traffic from the local roads and feed it into the arterial system. They typically provide both a land access and collector function, and thus are wider than local roads.

- In rural areas it is useful to subdivide collectors into two categories:
    - Full municipal responsibility rural collector raods are developed and financed by the rural jurisdiction on the at-large basis. That is, they are financed out of the municipal mill rate.
    - Rural collectors which have received the administrative classification of **secondary**, form part of a system developed jointly by the rural municipalities and the province. The rural municipality provides the right-of-way, the province pays for the construction, and the municipality is responsible for subsequent maintenance. (Some secondaries are built fully by the municipality).

Arterials: The major function of arterials is through movement. Depending on the demand for through movement, some land access function can also be accommodated. Low volume arterials may provide as much land access service as some collectors. Extremely high traffic demands require freeway standards and permit no direct access.

In rural areas the basic arterial system is the primary highway network, which has full provincial jurisdiction and financial responsibility. Some secondaries also provide an arterial function. For the most part these have been identified as the "900 series", where the province pays for any additional right-of-way required, construction and subsequent maintenance.

The impact of grain trucking on local roads is not severe. Grain producers are quite dispersed therefore individual local roads are not subjected to concentration of trucks. Truck trips begin to concentrate on the collector system which are in most cases either secondary roads or primary highways.

Road Expenditures and Maintenance: The task of calculating the effect of increased trucking activity or the use of bigger trucks on roads is very complex. The service life of pavements, both ashphalt and concrete, are influenced by axle weights and number of axle load repetitions. Pavements are initially designed to withstand an expected number and magnitude of load repetitions for the anticipated service life.

When a pavement is properly designed, it presumably will require only routine surface maintenance throughout its life, provided the expected number of axle load repetitions is not exceeded. In other words, it will not be damaged by the traffic it is designed to support.

Unexpected increases in loadings are likely to shorten the service life of the pavement. The result is an earlier application of the expected rehabilitation, usually a thicker overlay.

Primary highway pavements are usually designed for high volumes and heavy loads, so the incremental impact of changes in grain haul patterns is not large. Some secondary road pavements have been designed to take advantage of the lower expected traffic volume. It is in these cases where changed grain haul patterns can have a larger incremental effect.

The main impact of changes in grain haul patterns on road costs is on collectors which have an oiled surface. These surfaces do not have any structural strength, but are designed to provide a higher quality dust-free surface and to protect the subgrade from moisture. Oiled surfaces can only be successful in situations where there is not a substantial amount of trucking. Should there be an unexpected change in truck loading, there are two possibilities: If the total volume of cars and trucks is low enough, the road revert to gravel, which is much more economical to maintain. If the traffic volume is such that a gravel surface is unsafe because of dust, the road must be upgraded at a much higher cost.

Here is a moot question. If a relatively modest increase in grain trucking takes away the oiling option, and the road must be paved, all the traffic will benefit. So is it fair to assign the cost of paving to the increased grain or other trucking?

The provincial expenditures for construction of primary highways, approach roads, secondary roads, maintenance of primary and secondary highways and grants to counties and municipal districts were estimated at $605.7 million in 1984-85. A detailed breakdown of different types of expenditures related to highway and road maintenance is given in Table 17. Grants provided by the provincial government to counties and municipal districts and special areas amounted to over $27 million in 1984-85.

Road maintenance expenditures vary considerably from one type of road to another. For a two-lane primary paved highway it costs about $4,547 per kilometre per year in maintenance including snow ploughing and ditch maintenance. For two-lane secondary highways the costs are about $3,600 per kilometre per year. Gravelled road maintenance costs are estimated to be about $1,250/km/year. For oiled roads annual maintenance

expenditures are around $6,000 per kilometre and about $22,000 per kilometre every three years for re-oiling and grading.

It is anticipated that with an increase in trucking activity (only if producers have choice of mode) maintenance costs for the above roads

TABLE 17

PROVINCIAL GOVERNMENT ESTIMATE OF EXPENDITURES FOR HIGHWAY CONSTRUCTION AND MAINTENANCE, 1984-85

ELEMENT TITLE	1984-85 APPROPRIATION
Regional Administration	$12,102,683
Construction Programming Branch Administration	1,809,628
Construction of Primary Highways	193,937,000
Construction of Campsites and Rest Areas	1,477,800
Construction of Approach Roads	1,999,000
Construction of Roads to Provincial Parks	2,075,000
Construction of Vehicle Inspection Stations	578,000
Highway 40 Project	34,000,000
Construction of Secondary Roads	86,172,000
Construction of Forestry Roads	4,000,000
Special Projects	2,476,635
Improvement District Road Construction	30,000,000
Engineering Support	723,000
Grants - Counties & Municipal Districts	25,487,600
Grants - Special Areas	1,528,000
Grants - Street Assistance in Towns & Villages	7,500,000
Maintenance of Primary Highways	66,231,888
Maintenance of Improvement District Roads	14,803,337
Maintenance and Operation of Ferries	1,143,164
Resource Roads	38,129,596
Pavement Rehabilitation	45,000,000
Construction of Provincial Airport Facilities	3,667,206
Construction of Community Airport Facilities	5,818,199
Maintenance and Operation of Provincial Air Facilities	2,374,759
Improvement District Trust Account	22,687,700
TOTAL	**$604,904,000**

would not increase significantly. Grain producers would be either using larger trucks or engaging commercial/custom truckers which would reduce the number of axle repetitions on these roads. Several studies have shown that maintenance of roads for increased grain truck traffic would cost significantly less than rehabilitation or upgrading of branch lines.

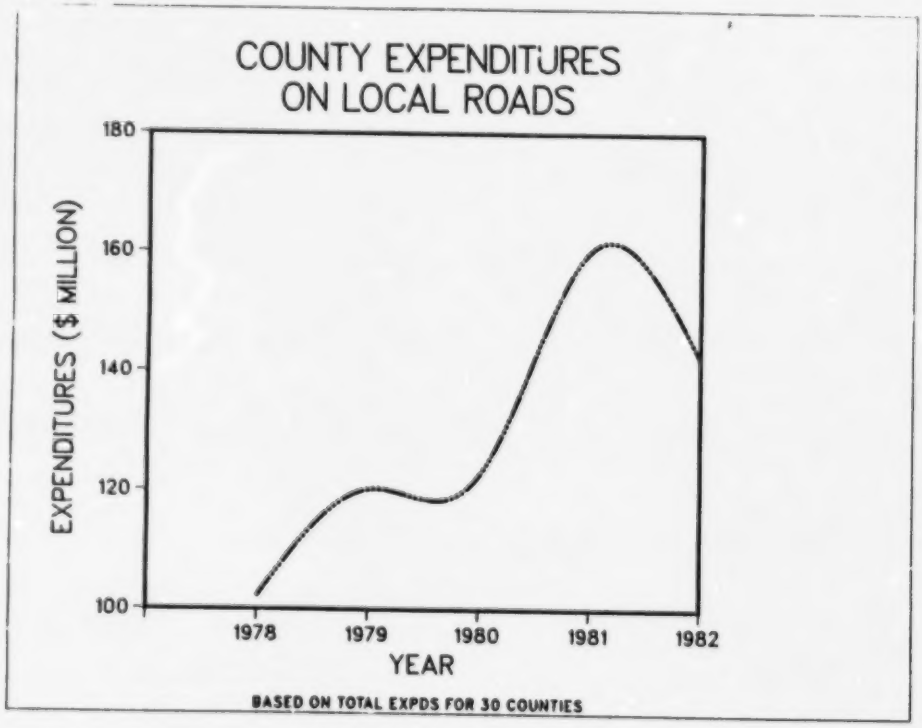
Estimates of county expenditures from 1978 to 1982 for improvement and maintenance of local roads are shown in Figure 5. Calculations show that 60 to 65 per cent of total municipal expenditures went for roads. In 1982, an average of $4.7 million per county was spent on municipal roads.

The municipal districts and county representatives have expressed concerns regarding increased truck hauling of grain in view of the rail lines abandoned. They have asked the provincial government to enter into a cost-sharing agreement with the federal government to increase regular road grants to all municipal districts and counties affected by rail line closures.

Impact of Changes in the Primary Grain Collection System

Significant changes have taken place in the primary grain collection system owing to rationalization of the primary grain elevator system and abandonment of rail branch lines. Grain producers who used to haul grain on an average of

FIGURE 5



11 kilometres (7 miles) are now hauling about 18 kilometres (11.1 miles) or more.

Long-term plans of the grain companies are difficult to predict but one thing is certain: these companies will continue to consolidate grain receiving facilities in order to lower overall operational costs. A number of primary elevators in the province require massive renovations or upgrading for efficient handling of grain.

Another change which could occur in the present grain collection system would be delivering grain to those elevators offering lower rail rates under the present rate zones. It would involve some extra hauling of grain, but a few points listed in Table 18 have been identified where the rail rate differential could result in changes of delivery points. A shift in grain delivery point would depend on factors like availability of space at the elevator offering a lower rate (capacity and throughput); other services offered at that point; road connections and conditions, the additional cost of trucking grain measured against any savings. Some of the selected points where there is potential for shifting deliveries are listed in Table 18.

The most common rate differential (farmer's share) is about $0.13 per tonne between neighboring elevators. Average distance between various points is about 10 to 13 kilometres (6 to 8 miles). In addition to the above points, there are other areas which offer savings from $0.26 to $1.14 per tonne but the distance range is quite large, i.e., 11 to 64 kilometres (7 to 40 miles).

The shift in grain deliveries is difficult to quantify exactly but there is some potential for it. Such a shift would require monitoring to determine the impact on roads. A grain producer's first preference is usually to deliver to the closest elevator, but if there is lack of space and the next elevator offers some incentive in terms of a lower rate, grain may be delivered there. Moreover, if producers employ custom or commercial truckers to haul their grain, there would be no additional charge for an extra 10 to 15 kilometres (6 to 9 miles) if they can benefit from a lower rail rate.

If throughput should decrease at some facilities for no apparent reason, grain companies would not hesitate to close those facilities. As mentioned above, distances travelled by grain producers to deliver grain have increased considerably and will continue to increase if efficiencies in the grain handling system are to be achieved.

Over the last several years, the concept of high throughput elevators has developed which provides a potential solution to some of the inefficiencies inherent in the present elevator system such as high fixed costs, slow grain car turn around, long storage time, slow loading and unloading, etc. The development of such a system could lead to a considerable reduction in cost to grain producers.

Impact of Trucking on Other Highway Traffic (Safety)

Safety is an important public concern on the nation's highways and local roads. As a result of increasing truck size and weight, there are general

TABLE 18

RATE DIFFERENTIAL BETWEEN NEIGHBOURING POINTS (SHIPPER'S SHARE)

Elevator Point	Rate $/tonne	Elevator Point	Rate $/tonne	Differential $/tonne	Distance (km)
Lanfine	8.33	Oyen	8.20	0.13	10-13
Ellerslie	7.95	Nisku	7.83	0.13	10
Spirit River	7.44	Rycroft	7.32	0.12	10
Falher	7.82	Girouxville	7.70	0.12	13
Erskine	7.70	Stettler	7.44	0.26	12
St. Michael	7.32	Star	7.06	0.26	16
Hardisty	8.20	Lougheed	7.44	0.76	58
Fairview	8.33	Rycroft	7.32	1.01	53
Hines Creek	8.46	Rycroft	7.32	1.14	64

safety concerns and concerns over effects on other transportation modes. These are controversial concerns and very little definitive data are available. However, an attempt has been made to extract information from a few of the studies undertaken on the safety of larger trucks.

Concerns about large trucks often focus on safety characteristics including stopping ability, jackknifing tendencies, sway or other lack of stability, and spray in inclement weather.

A study completed by the Ontario Commission on Truck Safety addressed two major safety areas, (a) accident frequency, and (b) accident severity. Information contained in this study is based on a review of the related literature and discussions with experts. Many researchers have attempted to answer the questions as to whether or not doubles have a worse safety record than singles. A lot of conflicting data have been produced and consequently, the question has not effectively been answered to the satisfaction of many people. Some of the findings from this study are presented below[1].

It has been frequently postulated that smaller cars and bigger trucks cause more accidents. This is

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[1] Ontario Commission on Truck Safety "Car-Truck Size Disparity", a study of the Nature and Safety Implications of Trends in Automobile and Truck Weights and Dimensions, by Delcan, June 1982

a complex question because accidents may sometimes involve a "phantom vehicle" not actually involved in the collision. "Phantom vehicle" involvement, whether it be a car or a truck, is virtually impossible to determine.

1. Where it is to their economic advantage carriers will tend to utilize trucks as large as the regulations permit. With an increasing use of larger vehicles, presuming that their capacity is utilized, fewer vehicles would be required to meet any given demand.

2. The aerodynamic effects of large vehicles on small vehicles are often considered a safety concern. One expert consulted on this topic noted that the actual mass of the automobile is not what is important, but rather, the concept of density is more relevant.

   The perception of a small car and large truck interacting aerodynamically, to present a potentially dangerous situation is commonly encountered, however, no evidence has been found that this will be a significant safety problem with the anticipated car and truck sizes.

3. Splash and spray generated by large vehicles are often considered to be a safety hazard to operators of smaller vehicles. No literature was found that identified the magnitude of this problem. Although splash and spray can be indeed be a safety hazard, research by the Western Highway Institute shows that it is speed, and not vehicle length, that increases splash and spray. Apparently, doubles and triples with single axles create less spray than tractor- semis with tandem axles at comparable speeds. Splash and spray may be a significant safety concern under especially degraded environmental conditions and when coupled with other safety reducing processes.

4. Traffic operations, especially on two lane roads, can be adversely affected by heavy trucks. Slow vehicles may, under certain conditions, "induce" accidents. When traffic flow is impeded, driver frustration increases and an unsafe passing manoeuvre may be attempted. Whether or not any ensuing accident can be attributed to the slow moving vehicle is debatable. The fact remains, however, that this is a potentially hazardous situation and should be avoided where possible.

   The consensus of opinion expressed by the experts is that car-truck accident rates will not be significantly influenced by vehicle size changes.

5. There are factors (other than vehicle mass or size) that have an influence upon accident severity. It is suggested that accident location (by road type) is one such factor. A paper by Hedlund found that: "accident location has a far greater effect on accident

   severity than does size or weight of the truck. An accident is more likely to be severe ... if it occurs on a rural two lane road."[2]

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[2] J. Hedlund, "The Severity of Large Truck Accidents," National Highway Traffic Safety Administration, 1977.

Owing to the strict controls exercised on the use of long combination vehicles, it is difficult to accurately assess their relative safety however, there is no evidence of decreased safety with use of the longer combinations or bigger trucks. Tractor-semis or any other configuration of trucks (A-trains or B-trains) would be less hazardous on the roads and also less demanding on pavements compared to single axles and tandems. Therefore, there should not be any major concerns about the safety aspect of such trucks.

SECTION VII

FUTURE ROLE OF TRUCKING

Since the early sixties, intra-provincial movement of grain from farms and country elevators to processors, feedmills, feed lots and local grain and seed companies has been dominated by commercial, custom and farm trucks, especially hauls originating from farms. As mentioned earlier, the role of trucks would continue to increase for hauling products over shorter as well as longer distances. Convenience of service from production areas to consumption sites or the consumer's door is a key factor in the growth of the commercial trucking industry. Development of fuel efficient equipment and new configurations of B- and C-trains have increased the trucking payload significantly, thus reducing the per unit cost of hauling products.

The extent to which trucks are used for intra-provincial hauling can be illustrated by the fact that most canola and other grain processing facilities in the province receive about 85 to 90 per cent of their deliveries by trucks. The significance of truck use is further enhanced when one considers that more than half of the deliveries to processing plants come from grain gathering stations located on a rail line.

Rail is used for a small percentage of the deliveries from primary elevators to processors where the length of haul and size of equipment are sufficient to make rail transport competitive with other modes. Otherwise commercial truckers are used exclusively.

Trucking is expected to play an important role in the movement of grain and grain products on the short hauls and to some extent on long hauls. However, development of trucking in the agriculture industry, specifically the grain sector, will depend to a greater extent on consolidation of branch lines, railway efficiencies, grain companies' efficiencies, the role of Alberta terminals, and the method of payment for the "Crow Benefit". Some of these factors are discussed in the following subsections.

Branch Line Consolidation

The original prairie branch line was the only real means of opening up the Prairies for full scale agricultural development. Construction of branch lines began in the late 1800's and the network expanded rapidly until the 1930s.

In the 1950s, when the operation of branch lines in the transportation of grain became unprofitable, the railways took steps to counter losses. The one obvious way of reducing losses on hauling grain was to abandon a significant portion of the branch line network. In the 1960s railways applied to the

Canadian Transportation Commission (CTC) for permission to abandon some of the nonprofitable branch lines. After several commissions and studies on railways, the federal government allowed the railways to request abandonment of uneconomical branch lines and began compensating the railways for losses on grain dependent lines. A significant portion of the branch line network has been protected from abandonment until the year 2000. The retained branch lines have become eligible for branch line subsidies under Section 258 of the Railways Act.

The government decision has prevented extensive abandonments, and the rehabilitation program has ensured that quality of the branch line network will be maintained or upgraded in order to improve the grain transportation system. For some branch lines, however, the volume of grain traffic did not warrant maintaining service, and these therefore, have been abandoned following the rail company's request and government hearings on the status of such lines.

The current status of railway branch line abandonments in Alberta is given in Table 19. Twenty per cent of the branch lines were abandoned prior to 1977, 53 per cent were abandoned between 1977 and 1981 upon recommendations of the Hall Commission, and 27 per cent were recommended for retention.

These abandonments have removed approximately 383 kilometres (238 miles) of Alberta branch lines from service. Further abandonments are not expected because most of the remaining branch lines in Alberta are protected to the year 2000 as part of the basic network. Two branch lines (Acadia Valley and Furness) are in question, and no decision will be made on these lines until the federal study on branch lines is completed.

To improve the overall grain transportation system, the federal government has undertaken several initiatives such as purchase of grain hopper cars, double tracking, and the branch line rehabilitation program, etc. The latter is discussed in some detail in the following subsection outlining the objectives and accomplishments so far.

In areas of the province where branch lines have been taken out and primary elevators closed, trucks have provided complementry service to the railways in collecting grain.

The Prairie Branch Line Rehabilitation Program

The basic objective of the rehabilitation program is to upgrade the grain-dependent branch lines in the basic network to be capable of carrying grain cars weighing a minimum of 99,000 kg (220,000 lb.) gross weight. Some lines will be upgraded to a maximum capacity of 118,350 kg (263,000 lb.).

Another objective of this program is to provide new connections whereever possible. These links will connect existing branch lines and allow the abandonment of uneconomical lines.

In June 1977, the federal government, as an interim measure, approved a two year, $100 million program to restore the badly deteriorated prairie branch line network. In March 1978, this rehabilitation program was extended to the remainder of the grain-dependent lines in the basic network at an additional cost of $600 million over

TABLE 19

STATUS OF RAILWAY BRANCH LINE ABANDONMENTS

Subdivision	Location	Category*	Mileage	Acres
Acquired to Date by Provincial Crown:				
CN Spondin	Scapa-Spondin	C	17.7	230.65
CN Haight	Inland-Haight Jct.	C	13.0	171.928
CN Kingman	Kingman-Barlee Jct.	C	10.3	141.31
	TOTAL		**41.0**	**543.888**
Abandoned, to be Acquired from Federal Government:				
CN Kingman	Tofield-Kingman	B	13.0	186.95
CN Haight	Inland-Vegreville	B	8.8	102.81
CP Woolford	Raley-Whiskey Gap	B	21.0	375.05
CP Crossfield	Cremona-Collicutt	B	27.1	477.573
CP Vegreville	Willingdon-Vegreville	B	24.6	351.40
CN Dodsland	Loverna-Sedalia	B	30.7	491.20
CN Dodsland	Sedalia-Hemaruka	B	19.8	300.16
CP Cassils	Cassils-Scandia	B	23.2	360.00
CP Suffield	Hays-Suffield	B	35.3	696.15
CP Rosemary	East Coulee-Finnegan	B	23.1	479.59
CN Sheerness	Cessford-Wardlow	B	7.4	153.37
CN Endiang	Byemoor-Nevis	B	40.9	590.93
CP Alberta Central	Forth-Otway	B	58.0	1046.21
CP Strathmore	Namaka-Gleichen	B	12.9	224.24
	TOTAL		**345.8**	**5835.633**
Abandoned, to be Acquired Directly from the Railways:				
CP Rosemary	Gem Jct.-Finnegan	C	29.8	481.78
CP Irricana	Irricana-Standard	C	35.3	636.29
CP Hoadley	Truman-Breton	C	34.0	503.99
CP Cardston	Omokta-Glenwood	B	12.7	204.516
CP Rosemary	Rosemary-Gem	Nil	11.8	273.626
CP Langdon	Kneehill-Kirkpatrick	Nil	3.9	67.79
CP Langdon	Kirkpatrick-Carbon	Nil	16.8	292.03
CP Strathmore	Strathmore-Namaka	B	7.8	135.59
CN Coronado	Lindbergh-Heinsburg	Nil	10.6	184.26
CN Coronado	Elk Point-Lindbergh	Nil	9.8	170.35
CN Endiang	Byemoor-Hanna	Nil	34.6	601.45
CP Furness	Paradise Valley-Epping	Nil	19.5	335.49
CP Strathmore	Langdon-Strathmore	Nil	19.1	245.10
CN Bodo	Cactus Lake-Bodo	Nil	12.0	208.60
	TOTAL		**257.7**	**4340.862**
Appealed:				
CN Stettler	Morrin-Edberg - Aug. 31/84	Nil	88.1	1815.2
CN Acadia Valley	Acadia Valley-Eyre-Nov.30/83	Nil	23.7	411.98
CP Langdon	East Coulee-Rosedale - Federal Court has ruled to be operated in perpetuity.			

* 'C' lines - abandoned prior to 1977.
'B' lines - Hall Commission recommended abandoned between 1977 and 1981.
'Nil' lines - not recommended for abandonment or retention by Hall Commission.

eight years. Thus, a total of $700 million, based on 1977 dollar cost estimates, was approved for this program for the ten year period commencing in 1977-78.

In 1983, as part of its Western Transportation Initiative, the government increased the total funding for the program to $1,069.5 million.

Qualification for grain-dependent status and eligibility for rehabilitation under this program are based on line traffic averaged over five years. A line qualifies for rehabilitation if 60 per cent or more of the total tonnage originating or terminating on the line, or final segment of it, is comprised of grain.

Basic prairie network protected by order-in-council from abandonment until the year 2000 and status of the rehabilitation program areas follows:

Railway Efficiency Measures

Railways should be encouraged to introduce efficiency measures and some new technology in their operations which could lead to cost savings to shippers. Railway cars which run around the country to collect grain should be able to pickup full loads at central places of the same grade of grain for export positions. Collecting grain for central loading stations can be complemented by commercial, custom or farm trucks.

Some of the technological innovations and efficiency measures which can result in considerable cost savings are as follows:

1. Technological Innovations: Current third generation locomotives have increased fuel economy 7 per cent over previous models. This amounts to roughly 2,100 gallons of fuel per year per locomotive. With further engine refinements, higher traction locomotives, improved operating procedures, and better maintenance, increases in fuel economy of 2 per cent per year are possible.

Railways should attempt to use six axle cars to increase the payload. Tare weight reductions of four or five tonnes and the high utilization of freight cars can increase tonne-kilometre productivity some 10 per cent in the near future.

Traffic control systems are the key to further improvements. These have the ability to increase system capacity without resorting to major capital investments. As the headway between trains is shortened, the capacity of the line is increased. Computers also take over many of the clerical duties allowing dispatchers to devote more time to higher order functions of traffic control, thereby increasing safety and efficiency.

Marshalling yards continue to be increasingly automated through computer applications which reduces freight terminal time, increase yard capacity and reduce labour intensive activities.

In the area of trackage innovations, continuous welded rail and concrete ties are claimed to last 50 years compared to 30 years for wooden ones. As well, the concrete tie reduces maintenance costs by 30 per cent.

Large track machines capable of lifting old rail ties, performing all maintenance functions

BASIC PRAIRIE NETWORK AND STATUS OF THE REHABILITATION PROGRAM*

	Basic Network	Total eligible for Rehabilitation	Rehabilitation Completed	Rehabilitation Scheduled for work 1984-89
CANADA	25,912 km (16,065 miles)	9,515 km (5,900 miles)	3,932 km (2,438 miles)	5,583 km (3,462 miles)
ALBERTA	8,545 km (5,298 miles)	1,920 km (1,190 miles)	947 km (587 miles)	972 km (603 miles)

* All figures are approximate.

and relaying new rail and concrete ties in one operation are proving effective. Estimates of rail replacement savings run as high as $3 million per year.

2. Long Term Outlook: The external factors which influence technological development in the rail industry include energy, capital, labour, demand, government policy regulation and safety. Energy is the most significant factor. It will most likely determine the policy on electrification, the future of alternate fuel development and encourage research in fuel-efficient technologies. Capital is the second most important factor. In the capital intensive rail industry, new technologies have been proven effective will not be implemented if the capital is not available.

   In general, the rail companies have a lot of new technology available to them which would increase efficiency and productivity and decrease costs. However, because of capital and regulatory barriers, the implementation of new technology will be a slow process.

   Despite this limitation, the transportation of freight, including grain, over long distances (over 500 kilometres) by rail should continue to be significantly cheaper than other modes in the foreseeable future.

3. Co-operation With Grain Companies: Many rail efficiency measures require associated changes by grain companies. For example, to decrease grain car turnaround time, things like high throughput elevators and consistent flow of grain are required. This change will require the close cooperation between the parties involved in the grain handling and transportation industry.

   One of the most beneficial changes to rail operations would be the implementation of unit trains. This would require changes in both grain collection methods and elevator facilities and in policy.

Expanded use of unit trains would also require adjustments at the port terminals. When the market demand begins to exceed the port terminals' capacity, producers and grain companies will apply pressure for unit trains hauling blocks of cars carrying the same grade of grain directly to ships.

Unit trains offer significant efficiency gains and allow producers and grain companies to respond to market demand.

a) Cabooseless Trains: "End of Train Units" ETU's - these eliminate one man, and possibly two, of a typical four man unit (leaving the engineer and conductor) which results in a decrease in labour costs.

b) Increasing Car Payload: Higher car loading may still be possible because of improved cars (lower tare weights) and the increased capacity of rail, etc. Higher tonnage trains may be possible as a result of railway grade reductions, high technology traction devices and mid train remote locomotives.

c) Speed of Train: Branch line rehabilitation is continuing and will allow speeds up to 50 km/h on branch lines that previously limited speeds to 15 km/h. This will result in decreased turnaround time.

d) Elimination of Waiting Time: Double tracking projects are underway which will eliminate waiting time especially through mountain passes. This will result in decreased turnaround times.

e) Compatible Working Hours: Making working hours of the railways and grain companies compatible will improve the grain handling and transportation system.

Grain Handling Efficiency Measures

If grain companies can introduce some efficiency measures in handling grain, considerable savings can be realized in costs. Some of the grain handling efficiency measures are:

1. High Throughput Elevators: A typical primary elevator in Alberta has a capacity of about 3,000 tonnes and usually operates at 2.5 to 3.5 turns per year, giving it an annual throughput of 7,500 to 12,000 tonnes.

   The concept of high throughput elevators was developed as a potential solution to some of the inefficiencies inherent in the present elevator system such as: high fixed costs, slow grain car turn around, long storage time, slow loading and unloading, etc. It involves the consolidation of primary elevators in an area and the development of a single high throughput elevator for the area by modifying existing facilities. Throughput can also be increased simply by introducing operational changes, such as longer hours of operation.

   Other changes which may also be necessary to convert an existing facility into a high throughput elevator are:

   - extend the length of sidings to carry longer strings of rail cars for loading
   - heavier track and/or upgrade roadbed for sidings. At many of the present facilities, cars cannot be loaded to 100 per cent

capacity; 70 per cent loading of cars is quite common

- improvements to unloading facilities to allow handling any size of truck. Upgrading terminal access roads to ensure adequate flow and capacity for the increase in truck volume
- provisions for on-site grain cleaning can offer further savings to producers and therefore may be a consideration in the development of high throughput elevators, and
- installation of modern computer management systems may be considered in order to achieve maximum cost efficiency.

Although some of the above changes may be required and/or desirable in the development of a particular high throughput elevator, in most cases, the capital investment required would be relatively small.

These changes should allow loading of 10-12 grain cars per day from one high throughput elevator compared to the 2 to 3 cars per day seen in a typical primary elevator's operation.

2. Projected Development: There are many factors which will affect the rate of consolidation of primary elevators and the subsequent development of high throughput elevators, thus it is difficult to make definite growth estimates. However, if we assume that the present market, and political and economic factors remain constant, some guesses can be made:

- development will continue to be slow over the short time (the next five years) in the order of 3 to 4 high throughput elevators developed per year per prairie province.
- development will likely speed up in the 1990s, and there may be 80 to 100 high throughput points across the prairies by the year 2000.

3. Off-Track Loading: Two basic types of off-track loading of grain have been proposed, each having several possible operational variations. The concept of each of the system is outlined below.

a) Container System: This system makes use of the C/TOFC (container/ trailer-on-flat car) designed in a modified form. Containers are dropped off at the farm where farmers fill them as they harvest. The containers are then picked up with a crane by tractor-flatbed units and hauled to a nearby nonelevator rail point. After the weight and grade are recorded, the containers would be emptied and immediately redistributed to farmers.

Loaded grain cars are sent to a central terminal/switching facility where they are routed to their proper destination. It is unlikely that the terminal would contain cleaning facilities as the elevation and cleaning of the grain at this point would compromise the time and handling efficiencies which the system offers. The entire process involves just one elevation of the grain at the port terminal.

b) Off-Track System: This is a true off-track system in that the initial destination of the grain is a

facility which is not associated with a rail branch line.

Grain is hauled by farm trucks to a relatively small facility, like a buffalo elevator, with minimal storage capacity. The grain is unloaded from the small trucks into the elevator which may or may not have cleaning facilities. From the elevator the grain is loaded into large trucks in A, B or C trailer configurations and these trucks would haul to a central terminal where the grain is loaded into hopper cars.

Alberta Terminals

Three inland terminals at Edmonton, Calgary and Lethbridge were purchased by Alberta Terminals Limited in the fall of 1979. Alberta Terminals Limited is owned by the Alberta government. The main purposes of purchasing these three inland terminals were:

- to ensure that farmers and grain companies have ready access to the terminals and thereby play a vital role in the enhancement of producers' income; and
- to increase the volume of grain going through the terminals to assist in meeting the urgent requirement of increasing Canada's grain exports.

The government has upgraded the three facilities to meet environmental concerns and efforts are being made to utilize these facilities to their maximum potential. At present, grain is being brought in by commercial, custom and farm trucks, and by rail, for cleaning and grading for further shipment to export positions. It is anticipated that with the introduction of variable rates, throughput would increase by 3 to 4 turns per year at these terminals.

Capacity and utilization of the three terminals are as follows[1]:

Edmonton:

The Edmonton terminal has a capacity of about 67,000 tonnes (2.5 million bushels). During the last year 90 per cent of grain received at the terminal was canola which was cleaned for export shipment. Balance of the receipts were feed wheat, barley and wheat for export. About 90 per cent of the deliveries to the terminal were by commercial, custom and farm trucks, but mostly by commercial trucks (9:1 in favour of commercial trucks. Hauling out of the terminal was about 10 per cent by truck and 90 per cent by rail. Approximate average load per commercial truck (semi) was 24 tonnes (960 bushels) and about 9 tonnes (360 bushels) per farm truck.

Calgary:

The Calgary terminal has a capacity of 61,000 tonnes (2.25 million bushel). Receipts of grain at this terminal included canola and coarse grains, of which 50 per cent was rapeseed for cleaning and export shipment. In 1983-84, considerable space at this terminal was being used for storing barley for Canada Malting Co. Limited. Most of the deliveries were by commercial trucks followed by rail.

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[1]Effective August 1, 1984, the three terminals have been licensed as primary elevators by the Canadian Grain Commission.

Lethbridge:

Lethbridge terminal has a capacity of about 34,000 tonnes (1.25 million bushels). Grain receipts here included more coarse grains and less canola. Wheat, oats, barley and mustard were cleaned for export. It received both board and non-board grains. Part of the facility is used for storing grain for other companies. This terminal is expected to show the highest throughput compared to the other two when variable rates are implemented. About 70-85 per cent of the deliveries to this terminal are by farm trucks and the balance are by commercial trucks.

There is no allocation of cars to these terminal elevators other than the ones allocated to grain companies/purchasers or users of grain. The elevators are being used as facilitators for the efficient movement of grain to export positions and to domestic users.

Because of the poor crop year (1984-85), there has been a considerable drop in throughput at all three terminals. Table 20 shows the monthly truck deliveries to these terminals from March 1981 to December 1983.

Long Term Plans: The long term plans for Alberta Terminals Limited are to continue to operate as handlers of grain and not purchasers of grain. The main thrust in the future would be to join with grain companies and ship grain in unit trains. The facilities would continue cleaning and grading grain for shippers who would be encouraged to use multiple cars and unit trains.

Once the variable rates are implemented, the operation of the terminals could be on 24 hour basis to allow the shippers to take advantage of lower rates. The variable rates would make grain transportation more efficient.

Terminal elevators would also continue making space available to grain companies, export grain companies, domestic feed users, specialty crop and other grain producers. With these facilities at central locations, more and more trucks would be used to haul grain from the farm and primary elevators for cleaning and grading purposes. Table 21 presents the annual throughput at Alberta Terminals Ltd. from 1974-75 to 1984-85.

Inland terminals can be used to clean, dry, grade and sample grain before shipping it to the coast for export. Retained screenings can be sold to ranchers/livestock producers in the province. In some situations, grain can be hauled directly to these terminals from farm storages. At high throughput elevators, efficiencies can be achieved through increasing output which can result in significant cost savings. Savings made at these elevators can be passed on to the grain producers to pay for additional trucking to reduce his/her trucking costs.

As the box and hopper car fleet is depleted, and the federal government has indicated that no more funds will be allocated for buying new cars, the available stock would require more optimal use and faster turn around time to haul grain. It can only be accomplished by using more centralized grain handling facilities across the province and trucks would play an important role in bringing grain to these facilities.

TABLE 20

MONTHLY TRUCK DELIVERIES TO ALBERTA TERMINALS, 1981-84[1]

Month	1981			1982			1983		
	Edmonton	Calgary	Lethbridge	Edmonton	Calgary	Lethbridge	Edmonton	Calgary	Lethbridge
	Number of Trucks								
January				168	349	120	124	163	N/A
February				262	263	132	92	66	
March	263	320	55	291	316	53	115	66	
April	410	468	56	232	149	115	84	99	
May	173	645	58	126	109	34	33	30	
June	587	707	250	174	126	50	160	46	
July	733	601	215	145	69	77	180	46	
August	131	65	147	14	351	42	31	66	
September	296	568	281	102	361	372	443	719	
October	327	202	260	470	317	283	564	464	
November	1060	443	172	288	321	231	323	323	
December	248	138	157	221	231	182	119	250	
TOTAL	4228	4157	1651	2493	2962	1691	2268	2338	N/A

N/A = not available

[1] - approximately 90 per cent of the receipts at terminals are by trucks;
- 10 per cent of the trucks are hauling out;
- of the 90 per cent deliveries - 10 per cent are farm trucks and 90 per cent are tractor-trailer unit with an exception at Lethbridge where farm truck deliveries are about 70 per cent.

TABLE 21

ANNUAL THROUGHPUT AT ALBERTA TERMINALS LTD.* (TONNES)

	Calgary	% of Total	Edmonton	% of Total	Lethbridge	% of Total	Total Throughput
1974-75	163,226	40	96,992	24	144,018	36	404,236
1975-76	98,322	36	137,410	51	36,176	13	271,908
1976-77	66,168	35	83,296	43	42,521	22	191,985
1977-78	54,963	39	63,726	45	23,258	16	141,947
1978-79	131,823	39	148,556	44	60,379	17	340,768
1979-80	87,360	32	127,822	47	56,298	21	271,480
1980-81	97,940	47	72,299	35	37,336	18	207,575
1981-82	63,238	40	66,573	42	27,863	18	157,674
1982-83	37,730	31	42,241	34	43,457	35	123,428
1983-84	48,764	29	50,277	30	68,700	41	167,741
1984-85	50,000	30	60,000	35	60,000	35	170,000

* Throughput = $\frac{\text{Receipts + Shipments}}{2}$

It is widely claimed that greater utilization of trucks to complement rail results in much greater efficiency in the entire grain collection and transportation system in such areas as:[2]

- faster turn around time of rail equipment,
- savings in expenditures in upgrading branch lines,
- flexibility of trucks in moving the kind of grain required from country elevators to mainline elevators or terminals to meet peak service demands at export terminals
- a more efficient grain collection system moves more grain, thereby lowering the farm inventory and improving the producer's cash-flow position
- greater use of trucks would create more jobs in farming communities
- truckers provide the essential flexibility in the collection system to move the right kind of grains to railhead in order to meet particular service requirements for export customers.

Terminal facilities can be used to develop unit train operations as was done during the 1973-74 crop year. The unit train concept allows railways to reduce costs by alleviating extra car handling and by encouraging long-haul traffic. The unit trains offer cost reductions through reduced switching expenses, faster turn around time and lower administrative expenses. Moreover, railroad efficiency is increased on long haul and nonstop traffic. Also, unit trains or multiple car shipments allow for better planning and increased car use. Commercial/custom trucks can serve as feeder to railways.

Grain companies using unit trains can afford to offer higher prices to farmers, which would force surrounding or nearby companies to become more efficient to remain price competitive.

Large volume shipments would prevent temporary blockage of elevator facilities so that farmers would not need to hold their grain or take it to less favorable markets which could reduce their returns. Moreover, railways will be able to predict more accurately the traffic volume, more efficiently allocate equipment and improve train turnaround time.

More in-depth study would be required to develop the unit train concept and how it can be coordinated with the hauling of grain by truck. At present there is more truck-haul capacity available than demand and it will be around for many more years. The Canadian Wheat Board model and several exercises undertaken in the United States could serve as benchmarker for evaluating, refining and implementing unit train operations.

Changes in the Statutory Rates and the Commercial Trucking Industry

According to trucking industry representatives, the Western Grain Transportation Act enacted on January 1, 1984 did not have a positive impact on

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[2] Submission on Behalf of the For-Hire Trucking Industry Concerning Bill C-155, to the Parliamentary Standing Committee on Transport, May 1983.

their industry. Two specific decisions, affecting the trucking industry are:

1. the addition of specialty crops, such as lentils, peas, sunflowers, canary seed, and alfalfa products, etc. to the list of crops that move by rail at the statutory rates, and
2. he decision to pay the Crow Benefit to the ilways.

The addition of specialty crops to the statutory rates list has had very little effect on Alberta truckers because of the low volume of production of such crops. Truckers believe that if the Crow Benefit were paid to producers, it would have given them a choice of mode which would have led to an efficient grain transportation system. They pointed out the grain companies' concerns that if the Crow Benefit were paid to producers, certain elevator points would be by-passed, which would not improve the grain handling and transportation system. Rationalization of the elevator system and rail branch lines is taking place and will continue but maybe at a slower pace than before.

Truckers strongly feel that payment to producers would lead to increased economic activity in rural communities because increased trucking would tend to create some new employment (administration, operation and maintenance) in these communities. At present the existing trucking capacity is under-utilized thus having negative economic impact on the rural communities.

During the last few years commercial trucking of grain within the province (intra-provincial) has declined somewhat compared to the seventies. Last year (1984) was one of the worst years for commercial truckers because of a drop in crop production because of drought. The decrease in grain traffic for commercial truckers can be associated with grain producers buying larger trucks and custom truckers coming on the scene. Another reason for the drop, may be that because of the lower rates offered by the railways, commercial trucking was not used for longer hauls of feed grains.

The trucking industry did not escape the effects of the downturn in the economy. The industry has not grown during the last few years, a lot of equipment has been sold off and the remaining trucks and trailers now need replacement. Commercial truckers hauling grain and grain products are still charging 1982-83 rates because of the fear of losing business if rates are increased. Profit margins for truckers have shrunk.

Most of the truckers in the grain hauling business feel that their role would increase if the grain handling and transportation system were allowed to be rationalized. Despite the fact that the pace of rationalization has slowed down because of the guaranteed rail network and branch line rehabilitation programs, etc., some elevators and branch lines will still go out of service and truckers see an increased participation in the grain handling system. As rail freight rates and hauling distances increase, producers will have to evaluate alternative to lower grain hauling costs. One posible alternative to partly offset these costs is the use of commercial custom truckers. partly be achieved by using commercial/custom truckers.

Since 1978, rail rates for hauling feed grains to British Columbia have been relatively lower than truck rates. As a result of these lower rates, considerable portion of grain hauling business has shifted to the railways (see Section V for details). Therefore, grain hauling for truckers which was considered front-haul (primary-haul) in the seventies is now regarded as back-haul (secondary-haul). The railways offer two types of rates for hauling feed grains to British Columbia which make it impossible for truckers to compete. One is a commodity rate which truckers can match and the other is a contract rate which is lower than the commodity rate and guarantees the railways 80 per cent of grain/feed grain merchant's business.

A few truckers have reported that during the last 6-7 years they have seen their grain business drop from 70-80 per cent to 25 per cent. The lower rates offered by the railways for B.C. traffic have forced them to switch to other products and haul grain as back-haul at a considerably reduced rate. One trucker who has been in the grain buying and trucking business for the last 20 years indicated that if the Feed Freight Assistance program were not there, he would not be in a position to haul grain grain to B.C. feed grain deficient areas. Another trucker pointed out that it does not matter what the rates are, it is the service provided by truckers which determines the business. Performance, flexibility and door-to-door service are the important factors which have guaranteed truckers a certain portion of the extra-provincial grain traffic.

Truckers point out that it costs much more to rehabilitate a branch line than to maintain secondary roads in spite of increased grain trucking activity. Larger trucks with proper differentials and weight distribution are likely to cause less damage than single axle and semi units owned by grain producers. A general consensus in the trucking industry is that there is currently a wide scale underutilization of the existing equipment available for commercial grain trucking, not only in Alberta but in the other prairie provinces as well.

SECTION VIII

SUMMARY

Trucking is an integral part of the grain handling and transportation system. The responsibility of transporting grain from the farm to shipping points i.e. primary elevators and other market outlets has rested with the grain producers. Since the beginning of the rationalization of the country elevator system and the abandonment of rail branch lines, trucks have played an important role in hauling grain from farm storage to primary delivery points and other market outlets (feed mills, feedlots, seed plants, etc.)

This study was undertaken to document present trucking activity (commercial and farm) for the transportation of grain and grain products in Alberta and to British Columbia - one of the major domestic markets for Alberta feed grains. Other objectives of the study were to determine the future role of trucking for hauling grain and grain products and to measure the effects of the reforms in the statutory rates on the trucking of grain.

During the last two decades trucking grain has increased considerably in Alberta. Changes to regulations on the length of vehicles and increases

in payload have helped the trucking industry to become more efficient and competitive.

Average truck hauls from farm to primary elevators and other market outlets have increased from 11 kilometres (7 miles) in 1967-68 to 18 kilometres (11.1 miles) in 1974-75. Lately it has been estimated that producers' grain hauling distances in some parts of the province range from 24 to 48 kilometres (15 to 30 miles).

Increases in grain hauling (truck) distances are due to the closure of country elevators and the abandonment of uneconomical rail branch lines.

Since 1965-66, elevators and delivery points have decreased by 44 and 37 per cent, respectively. Although overall capacity of the remaining elevators has declined by about 23 per cent during the last two decades, throughput at the existing facilities has more than doubled. Higher throughput would makes these facilities more economical and cost effective.

During the 1983-84 crop year, over 10 million tonnes of grain were delivered to primary elevators in Alberta by farm and commercial trucks. It is not possible to determine the volume of grain delivered by farm versus commercial trucks.

Farm Trucking Industry

Since 1976-77, a trend towards buying large farm trucks has emerged. In 1980-81, the number of heavier farm trucks, i.e., over 14,000 kg (30,860 lb.) GVW was 4.5 per cent which increased to 5.4 per cent during 1983-84. This change indicates that larger trucks are being used for hauling grain to market outlets. The most common farm trucks used for hauling grain are two and three axle trucks, the latter are also known as tandems. A few grain producers have purchased semis for their own use and for custom hauling.

The number of farm trucks in Alberta had been steadily increasing, but for the first time in 1983-84, it showed a decline of 3.4 per cent. According to 1983-84 farm vehicle registrations, there were 161,875 farm trucks in Alberta or an average of 2.8 trucks per farm.

Regulations Governing Commercial Grain Trucking and Size of the Industry

In western Canada, Alberta could be described as a "non-regulator" with respect to intra-provincial trucking. The province has no regulations with respect to service, conditions of carriage, rates, etc. for intra-provincial hauling of grain by commercial carriers.

For extra-provincial hauling, the regulatory environment in Alberta for commercial trucking is somewhat similar to that of other provinces, i.e. there is entry control. An extra-provincial motor carrier must apply to the Motor Transport Board for authorization. Restrictions (routes, commodities, areas, shippers, etc.) may be placed on this authorization and a nonresident operator may be issued a permit.

The present regulations are no impediment to the growth of the trucking industry, although complaints have been heard about entry and other related procedures. Anticipated changes in regulations in the trucking industry also known as "deregulation" of the industry would eliminate some of the concerns and, it is hoped, the industry would face uniform regulations across Canada

A commercial grain trucking fleet for intra and extra-provincial movement of grain peaked in the seventies with about 600-700 grain trailers in Alberta. In the mid-seventies trucks hauled more grain to feed deficient areas of British Columbia than rail. However, the trend reversed when the railways decided to implement truck competitive tariffs. The downturn in the economy and the drop in grain traffic forced many carriers to change their operations or to sell the equipment. At present, it is estimated that there are about 200-250 grain trailers operating in Alberta for the delivery of grain and grain products intra- and extra-provincially.

Farm and Commercial Truck Costs/Rates

Average farm truck costs estimated for the 1983-84 crop year were $5.12 per tonne (12.8 cents per bushel). These costs were for transporting grain from farm to primary elevators for a distance of 18 kilometres (11.1 miles). With the increase in distance, farm truck costs increased considerably in comparison to commercial truck grain hauling rates. For a distance of 48 kilometres (30 miles) or less, farm truck costs amount to $9.20 per tonne (23 cents per bushel) whereas commercial truck rates are $7.92 per tonne (19.8 cents per bushel) for farm pick up. These costs indicate that as distance increases commercial trucks become more economical for transporting grain from the farm. Moreover, commerial trucks can deliver three times more grain per trip than an average farm truck.

Trucking Activity for Transporting Grain to British Columbia

Commercial trucking activity for transporting grain and grain products from Alberta to B.C. was not a factor until the early seventies. The development of heavier, fuel efficient trucks, and changes in maximum weight limitations prompted the trucking industry to offer a rail competitive service. During the first four years (1973-74 to 1976-77), the share of truck traffic for feed grain shipments to British Columbia quadrupled. Railways realizing the erosion of service introduced truck competitive rates on March 1, 1978. These rates reversed the feed grain traffic trend in 1978-79 in favour of the railways. Since then the share of truck traffic has remained around 30 per cent of the feed grains shipped under the Feed Freight Assistance Program.

Commercial carriers pointed out that truck competitive rail rates and contract rates have forced them to haul grain as back-haul. For a few carriers, feed grains used to be front-haul traffic, but not any more, because of rate competition, it has become secondary traffic to these carriers.

Rail and Truck Rates for Feed Grains to British Columbia

Railways had a monopoly over the transportation of feed grains and grain products to the feed deficient areas of British Columbia. In the early seventies, commercial truckers offered their services to feed grain receivers in B.C., and within

few years were able to capture a significant share of the market away from the railways, i.e., from 6 per cent in 1971-72 to 56.1 per cent in 1976-77.

On March 1, 1978, the railways reduced their rates from $18.74 to $16.31 per tonne. In the next few years the railways recovered part of the traffic lost to truckers. The competitive truck rate in 1978 was $18.74 per tonne. Figure 6 shows fluctuations in rail rates and the trend of commercial truck rates. Truckers could not afford to match rail rates, therefore lost part of the feed grains traffic to the railways. Presently trucks are moving about 30 per cent of the feed grains shipped under the Feed Freight Assistance Program to British Columbia.

Some commercial carriers pointed out that grain traffic to B.C., which was front haul a few years ago, is now considered secondary and moves at the back-haul rate. Carriers have indicated that most of the time the back-haul rate does not even cover operating costs of the unit. Railways have also established contract rates which have further hurt the trucking industry. Under these rates, the railways are guaranteed 80 per cent of the grain/feed grain merchant's business. One carrier pointed out that if the Feed Freight Assistance Program were not in place, commercial carriers could not move feed grains to British Columbia.

Grain Trucking Industry and the Statutory Rates

Reforms in the statutory rates under the Western Grain Transportation Act did not have a positive impact on the grain trucking industry for two main reasons: 1) adding speciality crops to the statutory rates lists and 2) paying the Crow benefit to the railways.

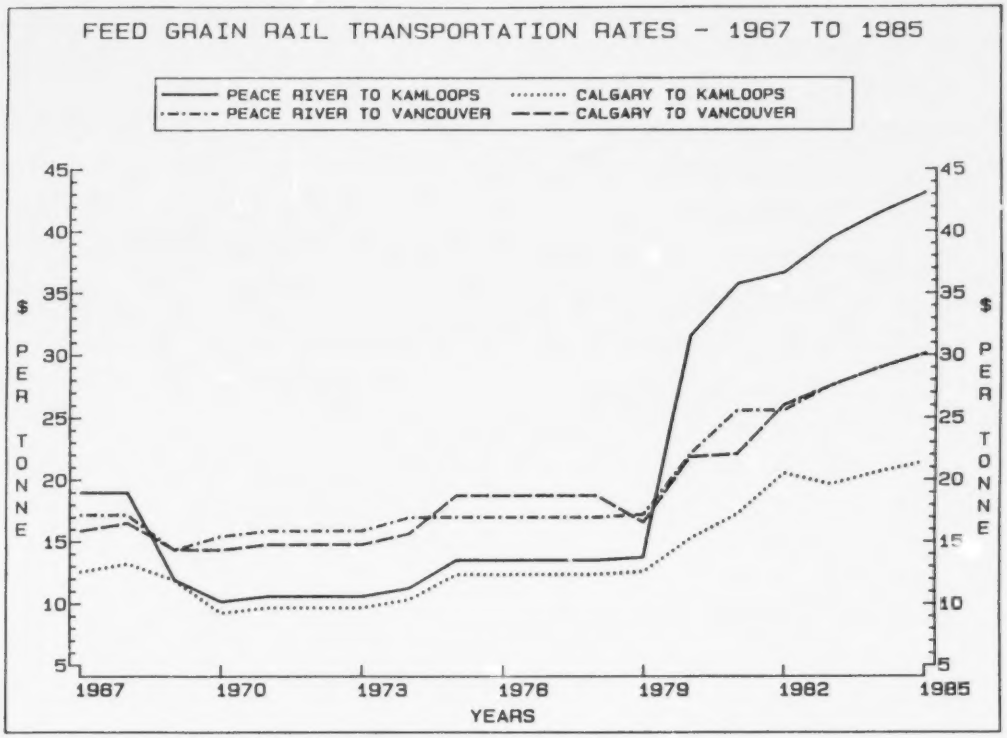
Commercial carriers were hoping that changes in the statutory rates would offer producers the choice of mode for transporting grain. They feel that the existing legislation has failed to do so. If the Crow benefit were paid to producers it would generate some economic activity in rural and urban communities. Representatives of the carriers' association have pointed out that the railways have been given what they had asked for while their industry has been over looked.

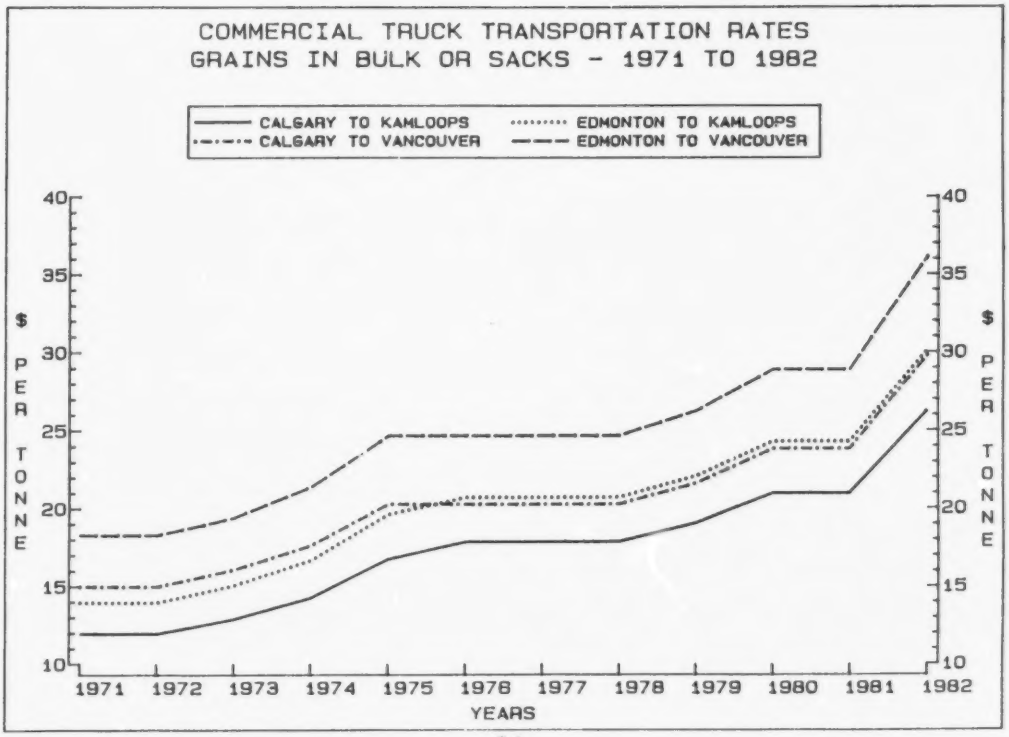
If no changes are made in the WGTA as to payment of the Crow benefit, the grain trucking fleet will be further reduced, leaving grain producers captive to the railways. Most carriers strongly feel that with their participation grain handling and transportation could become efficient. Moreover, as rates increase in the future and grain handling facilities are consolidated, truckers can offer some savings to grain producers for hauling grain longer distances.

Differential rate zones, i.e. the rail rate on grain, if significant will attract farmers from a long distance away. Premium offers can be made at high throughput elevators which would provide an incentive to farmers to deliver grain to that facility. Commercial/custom truckers can offer savings for additional haul of up to 16 kilometres (10 miles) at no extra charge.

FIGURE 6

RAIL AND TRUCK TRANSPORTATION RATES





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APPENDIX

TABLE A

DISTRIBUTION OF FARM TRUCKS BY GROSS VEHICLE WEIGHT AND AGE OF TRUCKS, 1981-82

Gross Vehicle Weight (kg)	Age of Trucks						
	up to 1960	1961-65	1966-70	1971-75	1976-80	1981 & over	Total
	Number of Trucks						
up to 2,000	148	153	419	1185	1653	763	4321
2,001- 3,000	704	1758	6126	10851	13008	2292	34739
3,001- 4,000	677	771	2754	6656	15400	4597	30855
4,001- 5,000	554	538	1835	6738	15788	2707	28160
5,001- 6,000	304	229	405	1304	8838	3303	14383
6,001- 7,000	505	1047	1328	664	1611	859	6014
7,001- 8,000	646	529	851	1591	2197	534	6348
8,001- 9,000	483	285	342	344	298	39	1791
9,001-10,000	708	454	509	259	58	9	1997
10,001-12,000	1709	1637	1996	1451	672	91	7556
12,001-14,000	1358	2354	4159	5707	5383	782	19743
over 14,000	206	484	1271	2362	2256	666	7245
TOTAL	8002	10239	21995	39112	67162	16642	163152
% of Total	4.9	6.3	13.5	24.0	41.2	10.2	100.0

Source: Solicitor General Department, Motor Vehicle Branch, Vehicle Registration Statistics.

TABLE B

DISTRIBUTION OF FARM TRUCKS BY GROSS VEHICLE WEIGHT AND AGE OF TRUCKS, 1982-83

Gross Vehicle Weight (kg)	Age of Trucks						
	up to 1960	1961-65	1966-70	1971-75	1976-80	1981 & over	Total
	Number of Trucks						
up to 2,000	-	-	1	1	4	12	18
2,001- 3,000	688	1572	5642	10607	14352	4900	37761
3,001- 4,000	570	642	2479	6013	14635	6691	31030
4,001- 5,000	493	496	1719	6501	15846	3947	29002
5,001- 6,000	295	215	440	1278	8454	5134	15816
6,001- 7,000	452	960	1241	620	1495	1273	6041
7,001- 8,000	574	516	875	1661	2383	756	6765
8,001- 9,000	471	290	348	379	313	58	1859
9,001-10,000	584	397	451	237	64	17	1750
10,001-12,000	1604	1519	1884	1460	752	138	7357
12,001-14,000	1372	2378	4352	6013	5840	1100	21055
over 14,000	215	490	1405	2805	2979	1160	9054
TOTAL	7318	9475	20837	37575	67117	25186	167508
% of Total	4.4	5.7	12.4	22.4	40.1	15.0	100.0

Source: Solicitor General Department, Motor Vehicle Branch, Vehicle Registration Statistics.

TABLE C

DISTRIBUTION OF FARM TRUCKS BY GROSS VEHICLE WEIGHT AND AGE OF TRUCKS, 1983-84

Gross Vehicle Weight (kg)	Age of Trucks						
	up to 1960	1961-65	1966-70	1971-75	1976-80	1981 & over	Total
	Number of Trucks						
up to 2,000	-	-	2	3	4	1	10
2,001- 3,000	549	1319	4882	9524	14023	6204	36501
3,001- 4,000	435	513	1989	5014	13160	7737	28848
4,001- 5,000	389	437	1457	5744	14740	4617	27385
5,001- 6,000	225	176	368	1094	7391	5484	14738
6,001- 7,000	384	858	1186	671	1877	2500	7476
7,001- 8,000	508	493	891	1664	2473	1057	7086
8,001- 9,000	414	259	336	375	321	83	1788
9,001-10,000	502	363	427	223	76	20	1611
10,001-12,000	1388	1396	1786	1421	752	170	6913
12,001-14,000	1246	2225	4249	5986	5892	1215	20813
over 14,000	167	456	1310	2773	2918	1082	8706
TOTAL	6207	8495	18883	34492	63627	30171	161875
% of Tota1	3.8	5.2	11.7	21.3	39.3	18.6	100.0

Source: Solicitor General Department, Motor Vehicle Branch, Vehicle Registration Statistics.

TABLE D

DISTRIBUTION OF FARM TRUCKS BY FUEL TYPE AND AGE OF TRUCKS, 1981-82

Age	FUEL TYPE						
	Gasoline	Diesel	Propane	Multifuel	Natural Gas	Not Reported	Total
	Number of Farm Trucks						
up to 1960	3300	21	-	-	-	4681	8002
1961-65	3810	52	-	-	-	6377	10239
1966-70	8600	141	2	-	-	13252	21995
1971-75	15364	347	6	-	-	23395	39112
1976-80	26833	786	10	-	1	39532	67162
1981 & over	7129	917	3	-	-	8593	16642
TOTAL	65036	2264	21	-	1	95830	163152
% of Total	39.9	1.4	0.0	-	0.0	58.5	100.0

Source: Motor Vehicle Branch, Solicitor General Department.

TABLE E

DISTRIBUTION OF FARM TRUCKS BY FUEL TYPE AND AGE OF TRUCKS, 1982-83

Age	FUEL TYPE						
	Gasoline	Diesel	Propane	Multifuel	Natural Gas	Not Reported	Total
	Number of Farm Trucks						
up to 1960	7296	18	2	-	-	2	7318
1961-65	9440	34	1	-	-	-	9475
1966-70	20434	394	4	1	-	4	20837
1971-75	36712	835	21	2	2	3	37575
1976-80	65239	1790	71	10	-	7	67117
1981 & over	22174	2965	38	3	1	5	25186
TOTAL	161295	6036	137	16	3	21	167508
% of Total	96.3	3.6	0.1	0.0	0.0	0.0	100.0

Source: Motor Vehicle Branch, Solicitor General Department.

TABLE F

DISTRIBUTION OF FARM TRUCKS BY FUEL TYPE AND AGE OF TRUCKS, 1983-84

Age		FUEL TYPE						
		Gasoline	Diesel	Propane	Multifuel	Natural Gas	Not Reported	Total
		Number of Farm Trucks						
up to 1960	6172	31	2	-	-	2	6207	
1961-65	8412	71	1	-	-	11	8495	
1966-70	18496	359	9	1	-	18	18883	
1971-75	33528	915	33	2	-	14	34492	
1976-80	61622	1806	155	13	-	31	63627	
1981 & over	26357	3709	77	8	1	19	30171	
TOTAL	154587	6891	277	24	1	95	161875	
% of Total	95.5	4.3	0.2	0.0	0.0	0.0	100.0	

Source: Motor Vehicle Branch, Solicitor General Department.